Handbook No. 27

SOUTH PACIFIC COMMISSION
FISHERIES OBSERVER MANUAL

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PREFACE

In an effort to assist your country to derive maximum benefit from its National Observer Programme, the South Pacific Commission is proposing this first edition of a standardised observer manual.

This manual describes the duties you will be called to perform as a fisheries observer. Its contents are based on the combined experiences of observers from SPC countries and Tuna Programme staff for the actual conditions encountered in the Pacific, and from observer programmes elsewhere for more general conditions. You should use it as a guideline to help you remember how to proceed. However, conditions will vary over time or from vessel to vessel, and it is your responsibility to adapt to the situation. Know your manual, use it when you can, and suggest possible improvements for future editions.

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1.0 INTRODUCTION

1.1 Fisheries Observer Programme

Your country, like most coastal states around the world, is interested in deriving some benefit from the resources of the seas within 200 miles of its shores. In the South Pacific, the most valuable of these resources are tuna and billfish caught by commercial operations. These operations make up one of the largest fisheries in the world which can bring in major economic benefits to your country in the form of revenues from fish sales, licence fees and employment opportunities. However, this resource is not unlimited and it should be monitored to make sure that there will be enough fish for the years to come. Your Fisheries Division has thus started collecting the biological and statistical information necessary to see to that.

This monitoring is done mostly by having foreign flag and local vessels fill out detailed catch forms. These forms, however, have some limitations, such as in the quality and the detail of the information they contain. One way to get round this problem is to have an observer, you, on board. You will be responsible for identifying problem areas with the catch reporting, as well as updating information about each kind of operation and the biology of the species fished. Your Fisheries Division will use the information you collect to improve the forms and to get a better feel of how the resource behaves under exploitation.

1.2 Duties and Priorities

1.2.1 National

Your priorities will be determined by your National policy. Write them down below in order of importance:

1.
2.
3.

1.2.2 Regional

SPC's regional objectives are (1) to provide a reference for the evalua- tion of catch reports (2) to provide a means to adjust the catch statistics for systematic misreporting, (3) to provide biological information on the exploited stocks, and (4) to collect general information about fishing activities (Tuna Programme 1983).

1.3 General Conduct

As an observer, you will experience different contacts with the crew depending on vessel type and nationality. There may be language barriers and cultural differences. Remember what you represent: your performance will be a reflection of your country, and of the entire regional observer programme. Your conduct will influence the success of future trips. Try to be friendly and to adapt to new situations. Always try to keep a tidy appearance and perform your duties without being in the way during the fishing operation.

Your presence on the vessel has been approved at the highest level, but may not be well accepted by the crew. It is your challenge to win their confidence. Always ask for permission before starting any activity and follow the ship's rules carefully. Do not attempt to "spy" information not available upon request, but report any deliberate obstruction to your duties. You are an observer only and your job is simply to observe.

2.0 TRIP PREPARATION

2.1 Instructions from Chief Fisheries Officer

Your Fisheries Officer will thoroughly discuss with you the objectives of your National programme and the duties you will have to perform in relation to each objective. This brief will also tell you the name, size, type and nationality of the vessel, how and where you will go on board and who to contact. Because the crew might expect you to participate in fishing activities during your trip, make sure you know the policy set by your Division Chief regarding working on board. It has been reported that the involvement of observers in regular fishing activities has caused the crew to rely on that extra hand, making it difficult to leave the work station to perform observer duties.

2.2 Background Information

Look at reports of trips on vessels of similar types, categories (e.g. Farman 1986; Gillett 1986a, 1986b; Wright 1980). These reports will give you an idea of the type of fishing operation you will be observing, if you are not already familiar with it, and how the catch may be sampled. Be aware of any problem or error already noted by previous observers and discuss them with your country's fisheries officer. Discussions with other experienced observers are also very informative and are encouraged.

You should review the parts of your observer manual dealing with the type of fishing vessel you will observe from. Review the sampling procedures and forms to fill out.

2.3 Personal Gear

You should make your own personal checklist, but the items listed below will give you an idea of minimum requirements.

2.3.1 Documents

If you are going to join or leave the vessel in a foreign country, make sure you have a passport with the necessary visas. Also carry a letter accrediting you for this mission (i.e. letter of introduction from your head office). It will be useful when dealing with the company's agent or the ship's captain.

2.3.2 Equipment

If you are going to perform some sampling, a mini tape recorder, plastic bags to protect recorder, extra tapes and extra batteries are essential. Other items include one camera with several rolls of film

(colour/black and white) (ask permission before taking photos), measuring device (board, tape measure, caliper), stationery (private log, paper, pens and pencils, eraser, straight edge). Your personal gear should include toiletries, non-skid shoes, boots, rain gear, "entertainment" (books, tapes, playing cards, etc.), sunglasses, protective suntan lotion, alarm clock, waterproof watch, warm clothes, medical kit (first aid).

Also carry:

- SPC catch forms for each gear type
- SPC Observer Manual
- Observer daily log sheets for each gear type
- Sampling sheets
- Nautical chart of the area
- Clipboard.

2.4 Trip Details

2.4.1 Travel arrangements

If the observer trip originates and ends in your own country, skip to the next section.

When you find out your estimated time and place of departure, study your travel schedule and itinerary to prepare the trip. Find out if the country of destination requires a visa or special arrangements. You should be aware, for instance, that when travelling to Pago Pago, for immigration purposes you probably will need a round-trip ticket, even if you are going to get off elsewhere.

It is a good idea to acquire visas for any country on the probable itinerary home. Visas are required for any American territory, Australia and Papua New Guinea. However, regulations vary with nationality (some nationals need a visa for the French territories) and may change over time, so you should do your own checking on the matter. You should also check the possible flight connections from your expected port of return.

Get the names and addresses of your contacts at the port of departure (ship's agent, consulate, foreign office); they will serve as liaisons. Notify your home office of your whereabouts during your trip. You also might want to pay a courtesy visit to the local fisheries division.

Once you have reached your port of departure, arrange to meet the ship's officers. In the case of Asian vessels, the ship's agent (who usually speaks English) may act as an interpreter. You should then make final arrangements for your accommodation on board, where to put away your gear and additional items that you may need (bed sheets, hard hat, if not provided), and get a confirmation of the departure time.

Explain, or have explained, to the captain and fishing master what your duties are and what your activities will be on the vessel. If there are any objections, try to resolve them now while you can still get in touch with your home office. At sea it will be much more difficult and could jeopardise the results of your trip. If you do not speak the crew's language, it is the time to get all practical questions answered and

become aware of the ship's rules. Clarify what is expected of you with regards to work policy, vessel policies, taking photos, eating and bathing schedules.

Should you be accommodated on the vessel while waiting for departure, you may have to contribute to the daily chores, such as galley duty and deck watch. Again, be aware of your Department's work policy.

2.4.2 Financial matters

Enquire on how much of your daily expenses will be met by your office. You should carry only the minimum in cash, enough to pay for snacks and bus fare from the airport to the hotel. Ask for an extra allowance for last minute gear purchases, other transportation or airport tax. The balance of your money for daily expenses and airfare, if you do not have a return ticket, should be carried in traveller's cheques.

3.0 LIFE ON BOARD

3.1 Living Conditions

Living conditions will probably be very different from what you are used to. Once you find out what the daily schedule is, respect it carefully. Your presence should cause the minimum of disturbance to the normal operation of the ship. Observe restricted areas and special customs (i.e. shoes off in certain areas on Asian ships, no smoking areas on all ships), and be courteous.

Food may be the most difficult change. If you foresee a problem, be sure to carry plenty of snacks.

3.2 Safety

Many activities conducted on board a fishing vessel are dangerous and you should therefore carry insurance. Although you may be covered as a regular crew member, it is a good idea to check up on the benefits you are eligible for and get additional coverage through your employer if need be. In addition, you may be several days away from medical care so you should take all precautions in avoiding personal injury:

1. Wear protective gear (non-skid shoes, gloves, hard hat)
2. Try to stay inside in rough seas
3. While outside on rough seas, stay within view of crew
4. Do not work around cables under strain
5. If doing ship transfers, wear life jacket
6. Wash carefully and dress small wounds with antiseptic
7. Be aware of safety equipment location (life vests, rafts, fire equipment).

3.3 Communication

You may try to prearrange radio contact with your home base. You will need the call number of the ship and of your base and a listening hour. During communication, do not mention fishing information or position.

3.4 Fishing Operation

Spend the first one or two days just getting familiar with the fishing operation (location and name of machinery are given in Appendices A,B and C). You should spend your time noting the sequence of events, referring to the manual sections when necessary, and filling out the gear checklist form. You should also use this time to plan your work. From the manual and your own observations determine how best to get your samples and information. If you did not have the opportunity to explain your duties to the ship's officers, do so now, especially if this is the first time they have an observer on board.

You should carry out all of the actual sampling; if crew members want to help, allow them to carry your equipment to set up a station. "Helpful" fishermen in other tasks, such as selecting fish and measuring, may introduce sampling errors and should be avoided.

Never carry your logbook outside the cabin as it could get lost or damaged. Data should be recorded on a plastic slate, notebook or tape recorder, and later transcribed to log sheets.

For a description of a typical purse seine, longline or pole-and-line operation, and the associated duties, refer to the appropriate appendix. Remember to make a note of any unusual observations: trust nothing to memory.

3.5 Daily Activities

Once all fishing activity has ceased for the day, you must copy all the information gathered on the appropriate forms. Depending on the gear type, there are several daily activity forms to fill out.

1. SPC catch form (based on your observations), Form C
2. Observer daily log form, Form D
3. Longline sampling sheets, Form E
4. Personal logbook.

Examples of forms C, D, and E are shown in the respective gear sections, and of the trip detail form (Form B) at the end of this section.

In your personal log, you should enter a summary of the day's activity in your own words (e.g. time up, time fishing, weather, observations different from other operations, things not covered in the manual, other fishing activity in the area).

3.5.1 Sampling

You may also be asked to collect biological information or perform some sampling, depending on national objectives. Sampling procedures for longliners are presented in Appendix C. Sampling procedures have not yet been developed for purse seine and pole-and-line vessels and directives to do so should be included in your brief, together with the guidelines to follow.

In Appendix D (page 57) you will find a taxonomic key to the major species caught in the Pacific by commercial operations.

4.0 CONCLUSION OF THE TRIP

4.1 Landing

Your duties do not stop when you get off the boat. You should attempt to get some additional information when the vessel is offloading. If possible, try to get the landing records for this trip. They will give you the actual weight and species composition of the catch.

You may also at this point observe other vessels unloading, and you should write down their names to monitor fleet activity, and if possible obtain landing records. However, all this information is often considered highly confidential by vessel owners and you should exercise discretion when making your enquiries. Do not press the matter if you meet with strong opposition.

After confirmation of your travel arrangements, either through the ship's agent or other contact (local Fisheries Officer), inform your home office of your arrival. Because there is a chance that airlines may lose your luggage, always hand-carry primary data (filled out log books, catch forms or sample sheets).

4.2 Reporting

4.2.1 Oral Report to the Chief Fisheries Officer

Immediately upon your return, you should give an oral report of your trip to your supervisor. The information is still fresh in your mind and questions from your supervisor will help you remember important details. He will also identify special items he will want to see in the report. These should include:

1. General description of the trip (duration, weather, catch)
2. Differences you noted from other fishing operations
3. Errors made by the crew in reporting catch on log forms
4. Relations with crew
5. Success of fish sampling.

4.2.2 Written report

Then you should write up a trip report. This trip report should go over the above remarks, and include a copy of each form you filled out on board. Do not hesitate to include unusual details noted in your personal diary (log). Maps, pictures and figures are often clearer to understand than a paragraph of text and are a good way to summarise a lot of information. A typical report table of contents might look like this:

Introduction
- General objectives of programme
- Specific objectives of this trip (if any)
- What this report will cover

Summary of Activities
- Dates of trip
- Number and type of operations observed
- Fishing area (map with daily or set positions)

Vessel and Gear
- Type and tonnage
- Number of crew
- Gear type
- (include gear checklist form and photos)

Operating Procedures
- Daily activities (schedule)
- Crew deployment
- Fishing operation
- (include photos, if any)

Catch
- Total catch
- Number of fishing days
- Catch/operation
- Species composition
- Discards
- Summary table

Miscellaneous
- Noted differences - biological sampling
- Life on board
- Travel
- Items not covered or not well covered in this manual

Conclusion
- Important things to remember from trip
- What to look for during next trip

4.3 Suggested Improvements to the Manual

You have just been in the field and we hope this manual has been useful in helping you plan and carry out your tasks. However, it is not perfect and we need your help to improve on it. Please send your comments and suggestions to:

Tuna Programme Co-ordinator
Tuna and Billfish Assessment Programme
South Pacific Commission
B.P. D5
NOUMEA CEDEX
New Caledonia.

You can include remarks such as:

- errors
- missing information that would have been helpful
- insufficient information.

Your contribution will make future trips easier for you and other observers.

REFERENCES

FARMAN, R.S. (1986). An investigation of longlining activities in the waters of Tonga (24 April - 19 May 1985). Tuna and Billfish Assessment Programme Technical Report No.17, South Pacific Commission, Noumea, New Caledonia.

GILLETT, R.D. (1986a). Observer trip on United States purse seine vessel (November-December 1984). Tuna and Billfish Assessment Programme Technical Report No.15, South Pacific Commission, Noumea, New Caledonia.

GILLETT, R.D. (1986b). Observations on two Japanese purse-seining operations in the Equatorial Pacific. Tuna and Billfish Assessment Programme Technical Report No.16, South Pacific Commission, Noumea, New Caledonia.

TUNA PROGRAMME (1983). Observer programmes. SPC/Fisheries 15/WP.10, Noumea, New Caledonia.

WRIGHT, A. (1980). An investigation of Japanese longline tuna fishing operations in the region of Papua New Guinea. Research Bulletin No.23, Department of Primary Industry, Port Moresby, Papua New Guinea.

INSTRUCTIONS FOR FILLING OUT FORM B (TRIP DETAIL FORM)

- PLEASE PRINT -

1. Name of observer - Print your surname first and your christian name last.

2. Vessel type - Two letters designating the type of vessel, e.g. LL for longline, PS for purse seine and PL for pole-and-line.

3. Call sign - The radio identification number of the vessel. You may get it from the agent or the radio operator.

4. Vessel name - The name of the vessel.

5. Nationality - The name of the country of registration of the vessel.

6. Registration number - The vessel's registration number. You may get it from the agent or the ship's specifications.

7. Permit number - The number issued by your country for the permission to fish.

8. Year built - The year the vessel was built. You may get it from the ship's specifications.

9. Gross tonnage - The number of tonnes for which the vessel is registered. You may get it from the ship's specifications.

10. Carrying capacity - The amount of fish that can be carried by the vessel when full. You may get it from the ship's specifications.

11. Horsepower - Power of the engine(s). You may get it from the ship's specifications.

12. Boarding date - Date on which you boarded the vessel, YY/MM/DD, e.g. 86/01/08 for 8 January 1986.

13. Boarding place - Port where you boarded the vessel.

14. Disembarking date - Date on which you left the vessel, YY/MM/DD, e.g. 86/02/15.

15. Disembarking place - Port where you left the vessel.

---NEXT SECTION - ONLY FILL OUT APPROPRIATE GEAR---

I. POLE-AND-LINE

16. Refrigerated bait - Does the vessel carry its own bait? - Y/N.

17. Baitfishing - Does the vessel participate in baitfishing activities?

Bouki-ami	Y/N	
Beach seine	Y/N	
Other	.....	explain

18. Number of crew - How many crew members?

19. Binoculars - Give the total number and power of binoculars used while searching for fish.

II. PURSE SEINE

20. Group seiner - Is the vessel you boarded part of a group seining operation? Y/N.

21. Number of boats - If yes, how many boats make up the group?

22. Aircraft - Is any type of aircraft used in spotting fish? Y/N.

23. Payaos - Does the vessel use any man-made raft for aggregating fish schools? Y/N.

24. Binoculars - Give the total number and power of binoculars used while searching for fish.

25. Net size - Give the length and depth of the net. Indicate which unit, fathoms or metres, you are using. The hang of the net is the length of webbing corresponding to the length of the net. It is usually expressed as a percentage.

III. LONGLINE

26. Refrigeration - What is the cold storage method used on board? Ice - Y/N, Freezer - Y/N.

27. Market - What is the destination of the fish caught? Cannery - Y/N, Sashimi - Y/N.

28. Number of crew - How many crew?

29. Line configuration -

The average number of baskets
The average number of branchlines
The average length of the floatline
The average length of the branchline
The average distance between floats (i.e. the length of the line between two floats.

---

30. Forms completed - How many forms of each category are included in your report?

- FORM B -

T R I P D E T A I L F O R M

NAME OF OBSERVER _____
Surname Christian name

VESSEL TYPE _____ CALL SIGN _____

VESSEL NAME _____ NATIONALITY _____

REGISTRATION NO. _____ PERMIT NO. _____

YEAR BUILT _____ GROSS TONNAGE _____ HORSEPOWER _____

CARRYING CAPACITY _____

BOARDING	DISEMBARKING
Date _____	Date _____
Place _____	Place _____

I. POLE-AND-LINE

Refrigerated bait ☐
Baitfishing - Bouki-ami ☐
Beach seine ☐
Other _____
No. of crew _____
Binoculars
No. _____
Power _____

II. PURSE SEINE

Group Seiner ☐ No. of boats _____
Aircraft ☐
Payaos ☐
Binoculars
No. _____
Power _____
Net size
Length _____
Depth _____
Hang _____

III. LONGLINE

Refrigeration
Ice ☐
Freezer ☐
Market
Canning ☐
Sashimi ☐
No. of crew _____
Line Configuration
Continuous line ☐
Coils or baskets ☐
Line hauler ☐

FORMS COMPLETED

TRIP DETAIL (B) _____
CATCH REPORT (C) _____
DAILY FORM (D) _____

APPENDIX A

OPERATING PROCEDURES ON BOARD A PURSE SEINE VESSEL

Introduction

Many nations are involved in purse seining in the Pacific. Boats vary in size from only 116 GRT to over 2000 GRT. However, they all use the same basic strategy, which is to encircle a school of tuna with a net and then to capture it by closing (pursing) the bottom end. Standard equipment (skiffs, nets, fish finders, airborne search) vary from boat to boat and, as an observer, it is one of your first duties to fill out the gear checklist form describing the gear and its specifications (Form B). Before you do, however, read this section carefully to become acquainted with the purse seining operation, the use of each piece of equipment and its name.

Figure A1 shows purse seiners of several different nations. Most differences between types are in the size and construction of their net and whether their searching strategy involves the use of an aircraft. Note that the Japanese have two types: the single and group seiners. Group seiners use the same method for catching fish as single seiners, but have no refrigerating capacity and rely on carrier boats to load the catch.

Fishing Operation

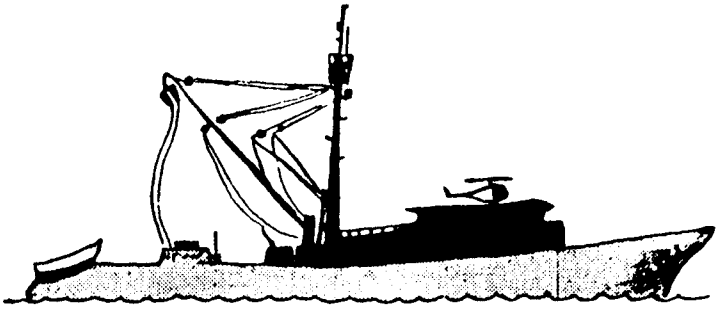
1. Searching

Searching is probably the best indication of a vessel's fishing effort and it is your responsibility to keep a good record of the daily searching activity. Searching is defined as the activity when one or more crew are making an attempt to locate fish. Tuna are found by direct observation when they are feeding at the surface, or in association with a variety of animals and objects such as birds, whales, trees (logs) or other flotsam. Note the starting time and finishing time of all searching activities, the number of people involved and the methods used. Also note the reading on the ship's log, the device keeping track of the distance covered. Some boats (American mostly) use helicopters for spotting schools or flotsam. Record flying time used for searching. Other vessels only search from the boat (crow's nest, flight deck) with binoculars. Make the same observations: crew rotations, investigation of flotsam, when searching begins and ends.

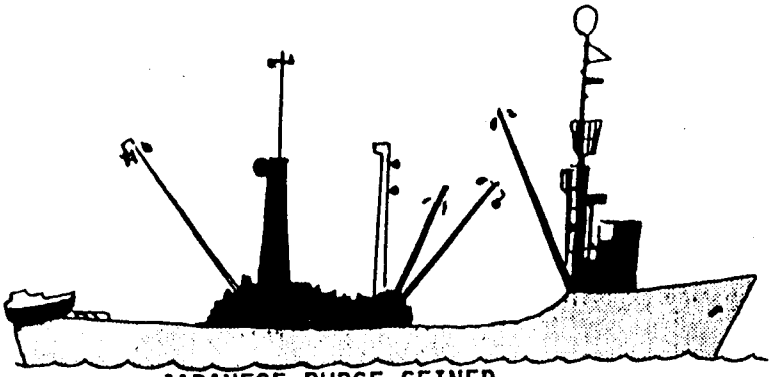
On board group seiners, three and sometimes four (if both carriers are on the fishing grounds) vessels are involved in the search. Try to keep informed of the other vessel's activities, especially when investigating a school or log and make notes of it in your personal diary.

In your narrative diary, note the sequence of events for this day's searching, including the number of visits to each flotsam and whether or not the boat is using its own floating object (payaos) to try and attract fish. Successive sets on the same flotsam should receive particular attention and can be identified by assigning a number to each object. Your diary might read like this, "... After this morning's log set, we proceeded to log No. 3 (marked yesterday). John and Paul on flight deck with X20 binoculars. One hour steaming time. One school sighted (note type of school according to instructions for Form D2, and approximate size from the crew's estimate) - too fast (position 10°00'N-130°00'E). Checked log 3 - still not much. Dropped one payao (No. 4) with radio marker. Chopper takes off 11.45 a.m. Serious search. Four spotters, one in crow's nest, all on X20s. Flying time 3h50min. X schools sighted

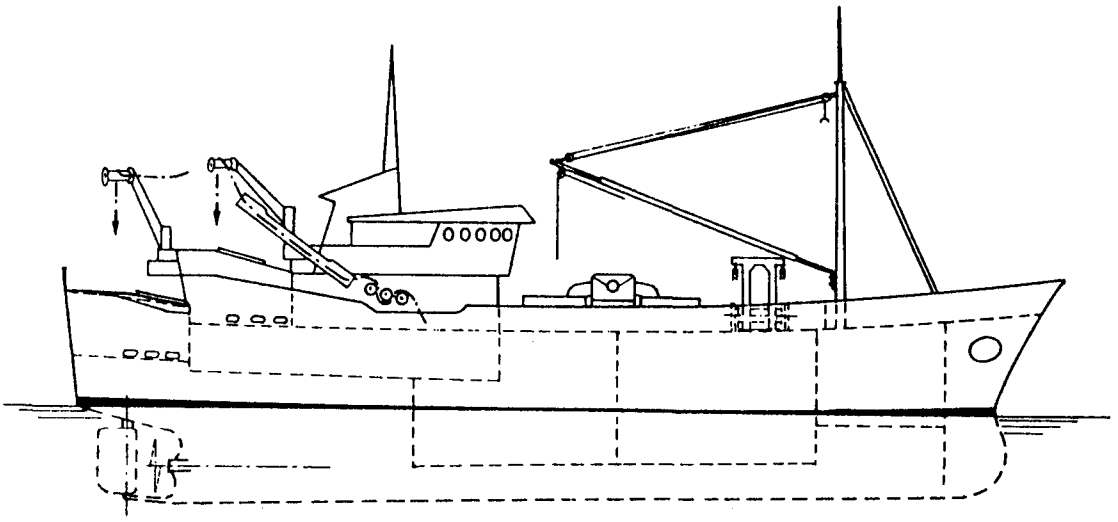
FIGURE A1. DIFFERENT STYLES OF PURSE SEINERS (NON-EXHAUSTIVE)



(a) UNITED STATES' PURSE SEINER



(b) JAPANESE PURSE SEINER



(c) European type purse seiner

Source: Drawings (a) and (b) reproduced with kind permission of Mr Don Aldous, Forum Fisheries Agency, Honiara, Solomon Islands.

(c): FAO (1985)

(position). Promising log - 30 min. steam. Good concentration of fish under the log. OK for dawn set. All activities stop 15.30 p.m. Drift."

Write in details; it will help you write your report!

2. Setting

If you are not already familiar with the purse seine technique, read the following paragraphs. Each stage is shown in Figure A2, and a list of gear names is given at the end of this appendix.

Free-swimming schools may be fished during daylight, but flotsam-associated schools are usually set on just prior to dawn. However, be it on a log, a raft or a surface school, setting procedures always follow the same sequence. Once the fishing master has decided to make the set, he instructs the captain or navigator to position the (net) boat in such a way as to end up with the school in the centre once the net has been set. With two seamen on board, the skiff, attached to the front end of the net, is released (Figure A2(1)). The boat steams 14-16 knots ahead quickly encircling the school or flotsam (Figure A2(2)). Before the net boat recovers the front end of the net, the entire net is in the water (Figure A2(3)). The rear end is then brought on board (Figure A2(4)) and pursing begins (Figure A2(5) and A2(6)). Details of these last stages are shown in Figure A3. Once pursing is finished (rings up = all rings on board), the net is hauled (Figure A2(7)). The vessels use one and sometimes two power blocks, one to take in the net and another to stack it on deck. Another system, seldom used in the Pacific, is the Norwegian Triplex system. It consists of vertical rollers that replace the power block taking in the net in the two block arrangement. Take a note of the system used on your trip.

When the net has been reduced to a small pocket (Figure A2(8)), the fish caught have to be loaded, which is done with a large brailing scoop. On the group seiners, fish are loaded onto the carrier boats.

Observer Duties

1. Daily Activities

Although you may spend long periods at sea, the time you actually have to make your observations can be very short because of the nature of the fishing operation. Therefore you should get organised so as to get the most important information first and then go on to the next as time permits.

Your most important duty is to give a detailed account of each day's activity. You have seen on page 14 an example of how to write your narrative diary on the events of a day searching.

You should also fill out the observer daily log (see pages 22-24 for instructions and example. It asks for a detailed breakdown of the activities by half-hour intervals or every time something new begins (e.g. chasing, fishing), so try to keep a good watch. You are not expected to stand 12 hours' watch every day, so note carefully when you start and stop monitoring the activities each day. If any temperature profile has been measured with an expendable bathythermograph - XBT - note the depth of each one degree interval on the form provided in Appendix C (page 55).

FIGURE A2. THE DIFFERENT STAGES OF A PURSE SEINE SET

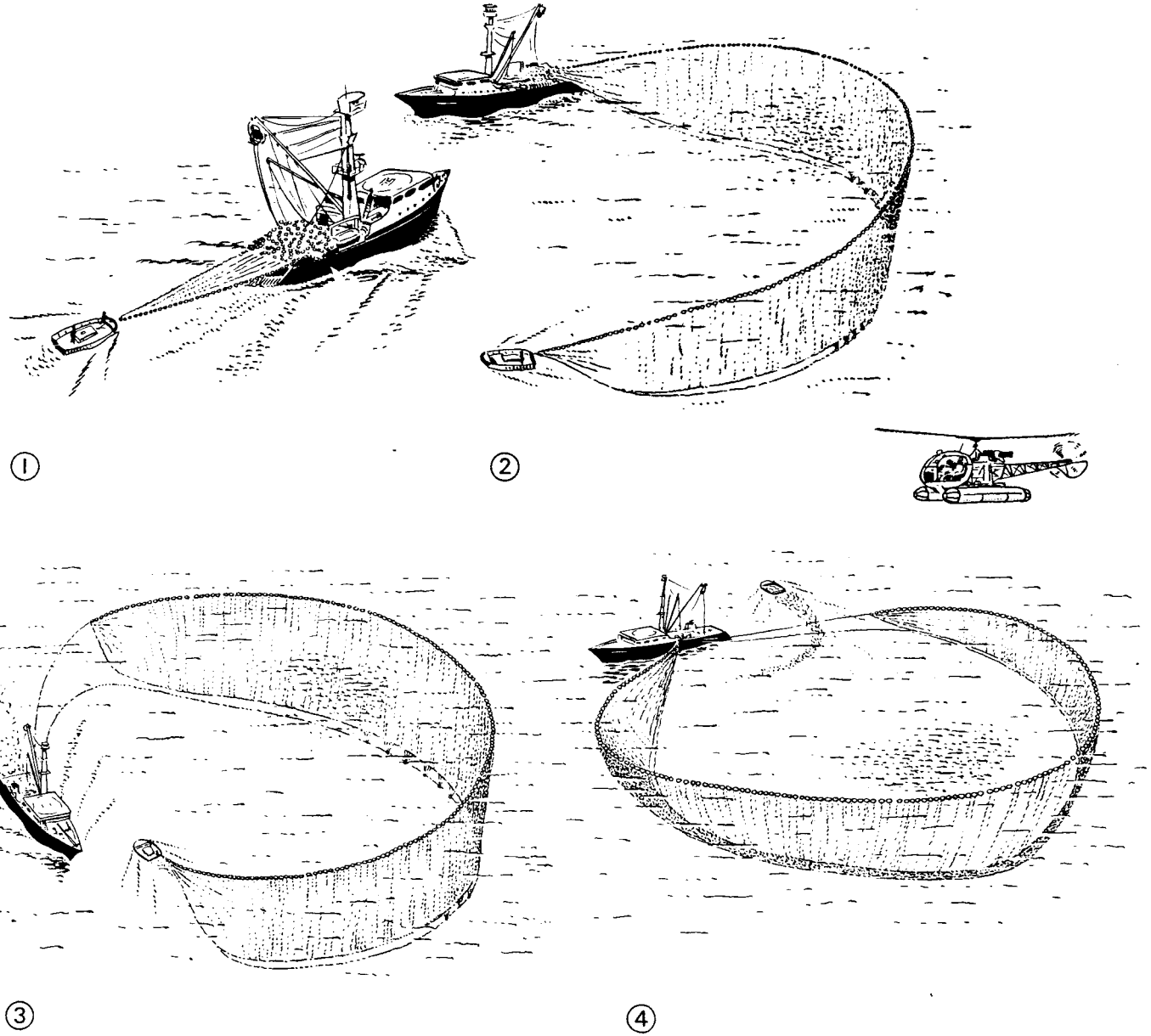
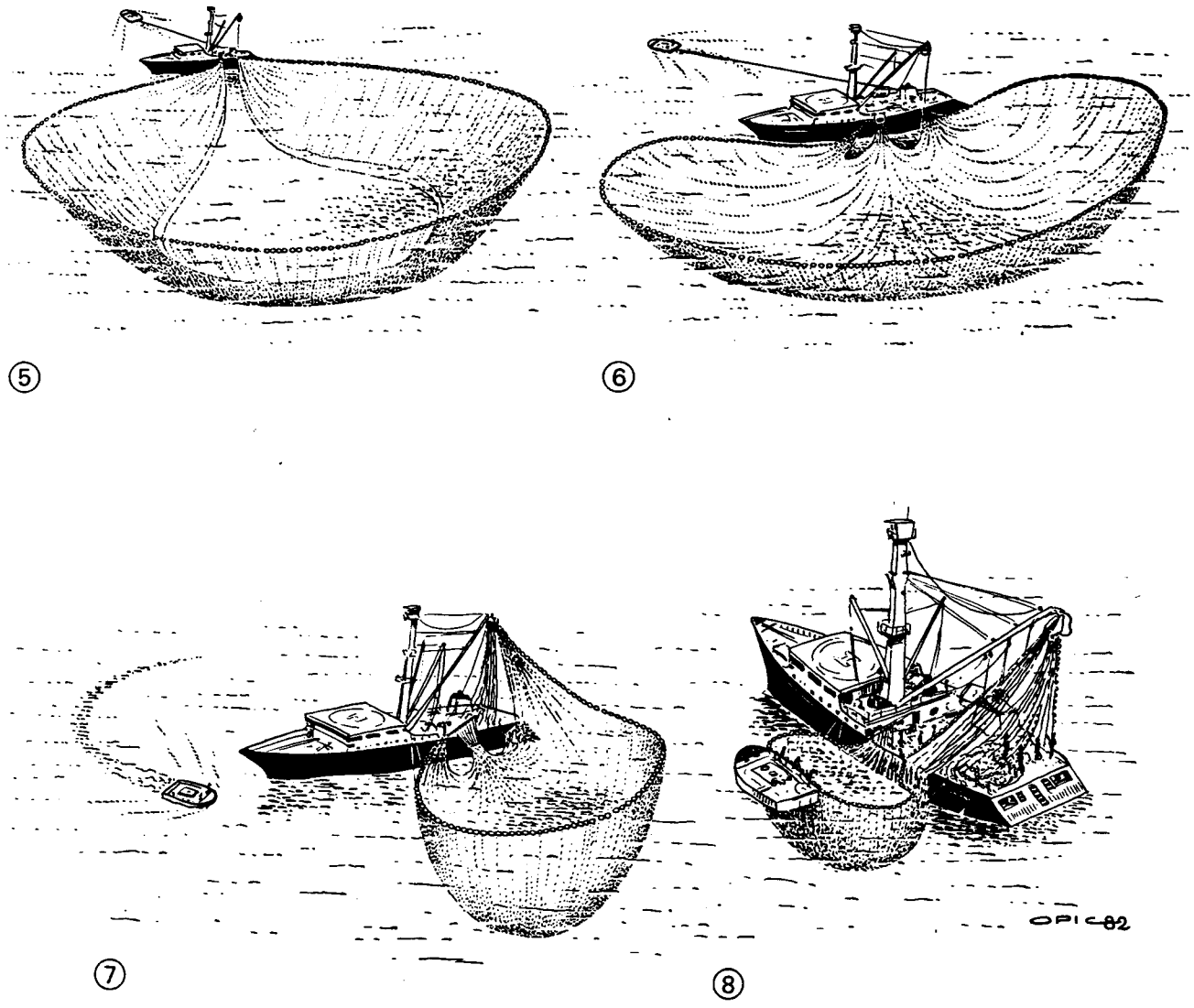
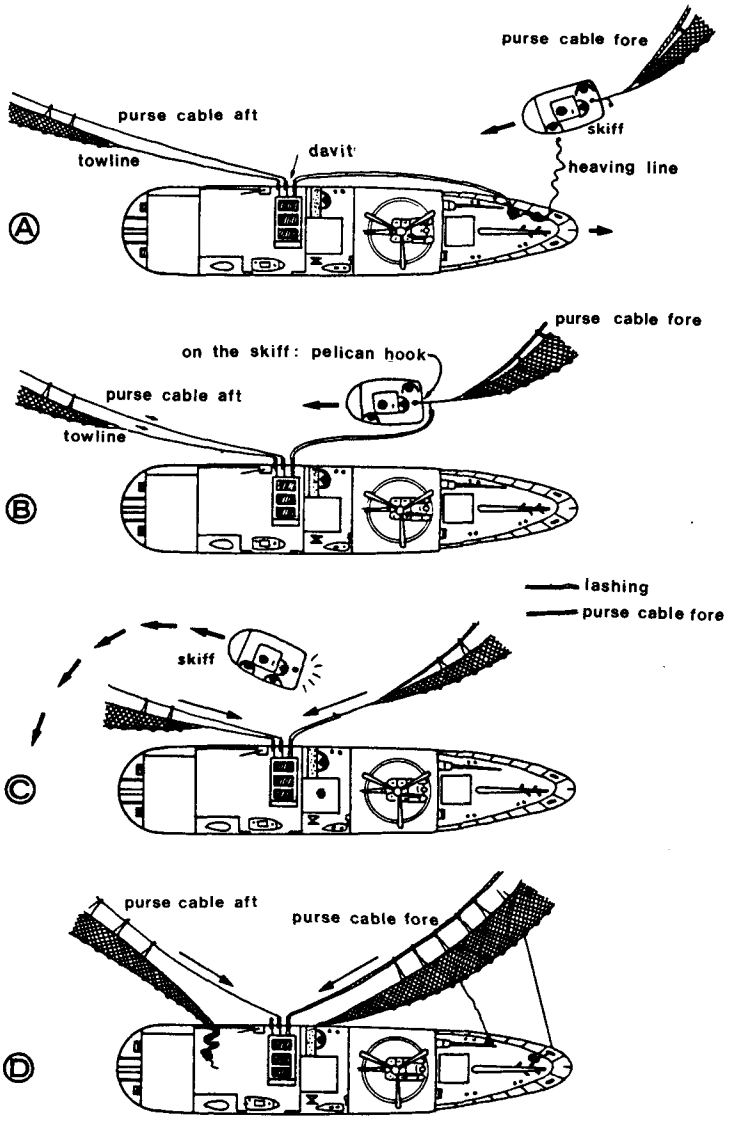


FIGURE A2. (cont.)



Source: Stequert and Marsac (1983).

FIGURE A3. DETAILS OF THE CLOSURE OF THE NET



Source: Stequert and Marsac (1983).

You should follow the same format for the catch information. Include any observation of particular interest, such as the occurrence of odd species in the catch (whales, billfish, turtles), mechanical problems resulting in a poor or zero catch, and more importantly, misreporting. Out of curiosity, the crew may leaf through your diary or ask to have a look at it. Therefore should you wish to keep any information confidential, you should think of writing it in your mother language.

Remember that we are also asking you to fill out a catch form (like the one filled out by the captain) from your own observations. This task is especially important if the captain does not fill in his until the end of the trip; it will help, by comparing with your copy, to see if anything was left out or forgotten. (See pages 25 and 26.)

You should thus try to get an estimate of total catch. The most knowledgeable persons to ask are the fishing master and the chief or refrigeration engineer. You should consult them after the catch has been loaded into the fish holds. By keeping a cumulative total, you will find out how close their estimate comes to the actual catch. Your total can also be checked against the carrying capacity of the vessel (either from the licence registration, the FFA Registry or the boat specifications).

The other items on the catch form that you should record are species composition and discards. You should be aware that bigeye are usually under-reported, mainly because the catch form does not specifically ask about the species, but also because they are sold for the same price as yellowfin and the fishermen put them together. Note the occurrence of bigeye, especially when it is not reported and try to make your own estimate of their proportion in the tonnage caught and compare it to the crew's estimate. You can take a percentage of the catch following these classifications:

rare	1-5%
some	up to 10%
many	up to 30%
lots	more than 30%.

If you are not familiar with the differences between yellowfin and bigeye, refer to Appendix E (page 67) for some helpful hints.

Discards are also often unreliably reported. Note important species such as billfish, but also any small-sized tuna that are discarded. You may get an estimate of total discards by subtracting the estimate of catch at brailing from the amount actually loaded in the holds. However, this is not a sure way, especially if discards are made later when transferring the fish. Also note unusual catches, both in numbers (e.g. large quantities of a particular species), in type (e.g. turtles) or in weight. After the day's fishing, you should transcribe the information for each set on separate forms.

Finally, and only if instructed to do so, you may sample the catch for length frequency distribution (i.e. measure fish). Follow the specific instructions that you received during your briefing.

REFERENCES

FAO (1985). Definition and classification of fishery vessel types. Fishery Information, Data and Statistics Service and Fishing Technology Service (comps). FAO Fisheries Technical Paper, (267):63 p.

STEQUERT, B. and F. MARSAC (1983). Pêche thonière à la senne - Expérience dans l'Océan Indien. Editions de l'Office de la Recherche Scientifique et Technique Outre-Mer. Collection Initiation et Documentation Technique No. 59, Paris, France.

INSTRUCTIONS FOR FILLING OUT FORM D2 (PURSE SEINE OBSERVER DAILY LOG)

- PLEASE PRINT -

1. Vessel name - Print the name of the vessel from which the observations have been made.

2. Your name - Print your surname.

3. Date - The date of the observations (YYMMDD), e.g. 860112 for 12 January 1986.

-----FOR THE REMAINDER OF THE FORM, FILL OUT ONE LINE AT EACH CHANGE OF ACTIVITY OR EVERY HOUR------

4. Time - Hour and minutes at which you observed the change in activity (searching, chasing a school, fishing or no operation) or at which you made this observation. Begin and end with the time at which you start and finish your watch.

5. Position - Longitude and latitude where this observation is taking place (if known).

6. Log - Log reading. The number card on the log dial (if permitted).

7. Activity - Write down the code describing the activity the vessel is engaged in at this time.

    1. Searching - At least one member of the crew is actively looking for tuna (or searching from aircraft).

    2. Chasing - The vessel is changing course to investigate a school or a sign (e.g. birds).

    3. Fishing - The fishing master has decided to make a set. Fishing starts when the skiff is released and finishes when the skiff is back on board.

    4. No operation - The vessel is not engaged in any of these activities.

8. Lookout - The number of crew members participating in searching activities.

9. Aircraft - If an aircraft is used for searching, indicate how many hours or minutes it spent in the air.

10. School sighted - The number of schools sighted by the crew since the last entry.

11. Log visited - First number = number of logs investigated, second number = logs that have been seen before (e.g. 4.2: 4 logs were visited, 2 of which had been visited previously).

12. School type - Write down one or two codes best describing the school fished.

    Unassociated
    1. Foamer/boiler
    2. Rippler/breezer
    3. Birds only

    Associated
    4. Natural log/debris
    5. Free-floating raft/payao
    6. Anchored raft/payao
    7. Animals (whales/sharks, etc.)

13. Catch - For each set write the catch (including zero) and weight range of skipjack, yellowfin and bigeye and write down the total fish catch out of that school, including discards.

    Weight ranges are:

SJ (kg)	YF/BE (kg)
<2	<5
>2	5-15
2-4	15-30
2-6	<30
4-6	30-50
4-8	15-50
6-8	>50
>8	>80
?(unknown)	?

14. Broken set - Reasons for unsuccessful sets.

15. Beaufort - A number between 0 and 12 describing the wind and sea condition (see the Beaufort scale in Appendix F, page 70). This should be carried out only three times a day, e.g. 6h00, 11h00, 14h00, and recorded on a corresponding activity.

16. SST - Sea surface temperature at the time of the observation.

17. XBT (expendable bathythermograph) - You will be recording the information on a separate sheet; just indicate that the device was used by ticking the box.

18. Comments - Additional information such as animal type in school type 4.

- FORM D2 -

PURSE SEINE OBSERVER DAILY LOG

VESSEL NAME: ______________________ YOUR NAME: ______________________ DATE: ________________

	POSITION											SJ		YF		BE							
TIME	LAT	N/S	LONG	E/W	LOG	ACTI-VITY	LOOK-OUT	AIR-CRAFT	SCHOOL SIGHTED	LOG VISITED	SCHOOL TYPE	CATCH	WT. RANGE	CATCH	WT. RANGE	CATCH	WT. RANGE	TOTAL CATCH	BROKEN SET	BEAU-FORT	SST	XBT	COMMENTS

ACTIVITY:

Searching 1
Chasing 2
Fishing 3
No operation 4

SCHOOL TYPE:

__Unassociated__

Foamer/boiler 1
Rippler/breezer 2
Birds only 3

__Associated__

Natural log/debris 4
Free floating raft/payao 5
Anchored raft/payao...............6
Animals (whales/sharks, etc.) 7

BROKEN SET:

Roll up 1
Too much current 2
Fish escaped 3
Breakdown 4
Bad weather 5

INSTRUCTIONS FOR COMPLETING DAILY TUNA CATCH RECORD

Purse Seine Vessels

(1) CATCH REPORT FOR WATERS OF - Give country in whose waters vessel is fishing, e.g. Papua New Guinea.

(2) VESSEL NAME - Give name in full, e.g. Tokiwa-Maru No.53.

(3) COUNTRY OF REGISTRATION - e.g. Japan.

(4) REGISTRATION NUMBER - As registered in country of registration given in (3), e.g. TK1-970.

(5) GROSS REGISTERED TONNAGE - To nearest tonne, e.g. 254.

(6) YEAR - Current calendar year, e.g. 1982.

(7) MONTH - Month to which this catch return refers. Use numbers from 1-12 for January to December, e.g. 9 for September.

(8) LICENCE/PERMIT NUMBER - Give complete number of permit to fish in the waters of the country given in (1), e.g. PNG 82/1234.

(9) NAME OF CAPTAIN - Give name in full.

(10) CAPTAIN'S SIGNATURE - Must be signed by the Captain as the person accepting responsibility for the accuracy of the catch declaration.

(11a) DEPARTURE FROM PORT - Give full name of port from which this cruise started, e.g. Shimizu.

(11b) DATE - Give date of departure from (11a) with year, followed by month, followed by day, e.g. 81/8/16 for 16 August 1981.

(12a) ARRIVAL AT PORT - Give full name of port at which cruise is terminated, e.g. Yaizu.

(12b) DATE - Give date of arrival at (12a), year/month/day, e.g. 81/10/27 for 27 October 1981.

(13) NUMBER OF CREW - Give total number of officers and crew on board.

(14) DAY - Use numbers from 1-31 for days of the month. One line should be used for each set, whether the set is successful or not. If no set was made for a full day when in the waters of the country in (1), give day number and appropriate comment from codes 1 to 5. A new page should be used for each country and for each month, e.g. if vessel commences fishing in Papua New Guinea waters on 23 August and leaves on 4 September, records should be made on one sheet for August, commencing day 23 and continuing to day 31, and a new sheet should then be used for September day 1 to day 4.

(15) NOON POSITION - Give latitude and longitude to nearest minute and add N or S for north or south latitude and E or W for east or west longitude.

(16) SCHOOL TYPE - Give appropriate number from 1 to 6 as school type code.

(17) TIME SET - Give time of commencement of set, e.g. 1420 (hours).

(18) SKIPJACK - Give catch in metric tonnes to the nearest tonne, e.g. 27, and average size to nearest .1 kg, e.g. 4.2

(19) YELLOWFIN - As for skipjack.

(20) OTHER SPECIES - Give name of the dominant species only, e.g. rainbow runner, and give weight and size as for skipjack.

(21) COMMENTS - Give appropriate number from codes 1 to 7.

(22) DISCARDS - All fish which are caught but not maintained on board must be declared and a reason given from codes 1 to 4.

The completed form must be signed and a copy posted airmail immediately to the Fisheries Department of the country in whose waters fishing was carried out.

At the same time the original should be airmailed to:

Tuna Programme Co-ordinator,
South Pacific Commission,
Post Box D5,
NOUMEA CEDEX,
New Caledonia.

PURSE SEINE VESSEL - CATCH REPORT FOR WATERS OF ....

	NAME		YYMMDD
DEPARTURE FROM PORT		DATE	
ARRIVAL AT PORT		DATE	

VESSEL NAME ______________________________

COUNTRY OF REGISTRATION ______________________________

REGISTRATION NUMBER ______________________________

GROSS REGISTERED TONNAGE ______________________________

NAME(S) OF FISH CARRIER(S) FOR GROUP PURSE-SEINER ______________________________

LICENSE/PERMIT NUMBER ______________

NAME OF CAPTAIN ______________

LICENSE/PERMIT HOLDER'S SIGNATURE ______________

YEAR ________ MONTH ________

NUMBER OF CREW	

DAY	NOON OR SET POSITION				SCHOOL TYPE	TIME SET	SKIPJACK		YELLOWFIN		OTHER SPECIES			COMMENTS	DISCARDS		
	LAT		LONG				CATCH (mt)	AV. SIZE (kg)	CATCH (mt)	AV. SIZE (kg)	SPECIES NAME	CATCH (mt)	AV. SIZE (kg)		TUNA (mt)	OTHERS (mt)	REASON FOR DISCARD
	DDMM	N S	DDDMM	E W													
					( )									( )			( )
					( )									( )			( )
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					( )									( )			( )
					( )									( )			( )
TOTAL																	

NUMERICAL EXPRESSION OF SCHOOL TYPE, COMMENTS, AND REASON FOR DISCARD

****

SCHOOL TYPE

1 Log
2 Surface
3 Whale
4 Porpoise
5 Raft
6 Other

COMMENTS

1 A full day in transit between fishing grounds or to or from fishing grounds.
2 A full day not fishing due to breakdown.
3 A full day not fishing due to bad weather.
4 A full day searching for fish but no sets made.
5 Part of day searching for fish but no sets made.
6 Set unsucessful for any reason, e.g. fish dive, roll up.

REASON FOR DISCARD

1 Undesirable species
2 Fish too small
3 Vessel completely loaded
4 Other reason - please specify

....

SPECIALISED TERMS USED ABOARD UNITED STATES PURSE SEINE VESSELS

Rigging and Deck Machinery

Cherry picker. A reel-type hydraulic winch, cable and hook mounted on an arm which can be extended and rotated. Can be used to launch speedboats or load cargo. Frequently mounted on the bow deck and the starboard side of the speedboat deck.

Choker. Hydraulic reel-type winch and Sampson Braid line mounted on the starboard side of the work deck. The line from the winch is wrapped around a section of the net, and tension from the winch causes the line to draw tightly on the net. During sacking-up, one choker is used to prevent the net from slipping out over the power block, and another is used to prevent mesh of the sack from slipping overboard.

Double hydraulic. Reel type hydraulic winch and cable which is reeved through double blocks and attached to a hook. This winch is used for lifting the heaviest loads and for pulling the skiff onboard. Operation is controlled by a lever on the hydraulic console.

Gooseneck. A steel fitting used to attach a boom to the mast.

Gypsy, "Niggerhead". A revolving winch head around which cable or lines can be wrapped for pulling loads.

Hydraulic console. A control panel at the aft end of the speedboat deck from which the operation of the hydraulic winches is controlled.

Main boom. A large steel spar attached to the mast above the level of the work deck and extending upwards and aft.

Mast. The tall tower centrally located on a purse seine vessel.

Nesting winch-Inhaul winch. A winch and cable mounted on the main boom, which is used to control the angle of the power block.

Power block. An hydraulic roller mounted on the upper end of the main boom. Used for retrieving the net from the water.

Purse davit. A davit located on the port side of the work deck, even with the purse winch. Heavy blocks are attached to these davits and guide the purse cables during net setting and pursing.

Purse winch. A large, powerful hydraulic winch mounted in the centre of the work deck aft of the mast. Used to haul in both ends of the purse cable to close the opening at the bottom of the net.

Ring stripper. Hydraulically operated arm located on the port rail just aft of the purse davits on the work deck. The arm of the stripper is raised and collects the rings of the net after they have been raised to the surface by the purse winch and to overhead level by the double hydraulic winch.

Single electric. Reel-type electric winch, cable and hook mounted on a boom over the work deck. Operation is controlled by a switch on a cord.

Single hydraulic. Reel-type hydraulic winch, cable, and hook mounted on a boom over the work deck. Operation is controlled by a lever on the hydraulic console.

Small booms. Two steel spars which are smaller than the main boom and which are attached to the mast to port and to starboard of the main boom attachment. These booms extend upwards; one towards port and aft, the other to starboard and aft.

Speedboat davits. Two sets of arms, usually hydraulically operated and located on the starboard side of the work deck. Used to support and launch speedboats.

Tire. Device resembling an automobile tire which is used to apply pressure on the net as it travels over the power block to ensure that the net does not slip.

Topping lift. A winch and cable used to raise or lower a boom.

Vang. A winch and cable used to move a boom to starboard or to port.

APPENDIX B

OPERATING PROCEDURES ON BOARD A POLE-AND-LINE VESSEL

Introduction

Pole-and-line vessels fish the same surface populations as purse seiners but with a lower efficiency, which has contributed to their decline in the last five years. However, the better quality of their product brings a higher price and their operation is economical if all the conditions are right (low labour costs, bait availability, proximity of fishing grounds, outlet for the fish ...). This section provides a summarised description of a typical pole-and-line operation.

Fishing Operation

1. Searching

Searching is probably the best indication of a vessel's fishing effort and it is your responsibility to keep a good record of the daily searching activity. Searching is defined as the activity when one or more crew are making an attempt to locate fish by direct observation. Searching is conducted in the same manner as in a purse seine operation. More schools, however, may be suitable for pole-and-line fishing and therefore more time is allocated to the investigation of those schools (trolling, baiting). Note the starting time and finishing time of all searching activities, the number of people involved and the methods used. Also note the reading on the ship's log, the device keeping track of the distance covered. In your narrative diary, note the sequence of events for this day's searching. It might read like this, "... Started searching at 6.30 a.m. John and Paul on deck with X20 binoculars. One hour steaming time. One school sighted (note type of school according to instructions for form D2, and approximate size from the crew's estimate) - chummed but no response (position 10°00'N-130°00'E). Tried log - still not much response. Serious search. Four spotters, all on X20s. 5 schools sighted (position, 3 schools fished). Good fishing overall. All activities stop 19.30 p.m. Drift."

Fishing masters are familiar with the fishing grounds for each season. Note if the vessel steamed straight to these grounds or if they prospected an area. Fishing vessels of the same company or nationality will share information. Note if you re-routed due to information received from other vessels in the fleet. Finally, note any information you may get from the crew on how they select a new fishing ground (e.g. ocean currents, temperature, sea mounts, etc.).

Write in details; it will help you write your report!

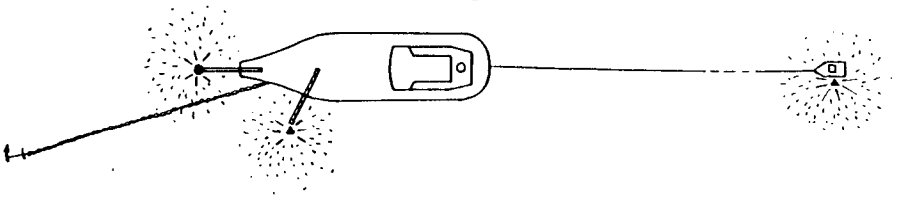
2. Fishing

Baitfishing

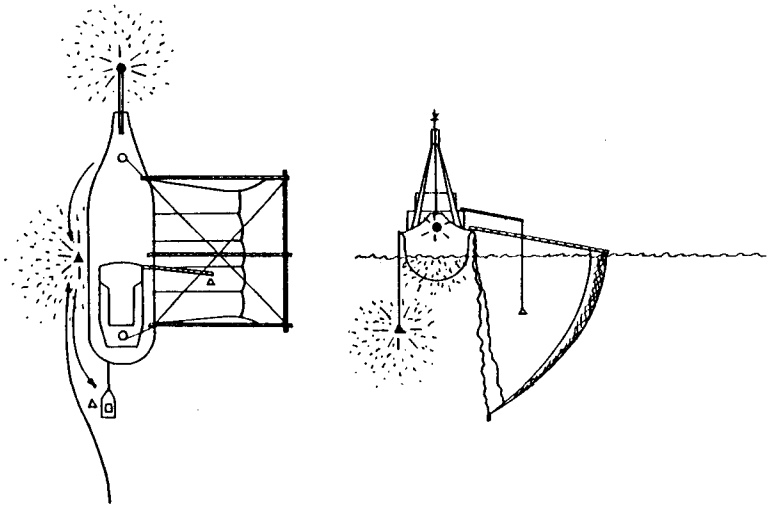
Unless the vessel is carrying bait from foreign sources, it will have to catch bait. This is done at night by setting a lift net with attraction lights. The lights are turned on for several hours or until a sufficient amount of bait is brought together (as shown by echo sounder) before the net is lifted. The net or "bouki-ami" is a rectangular panel set from the vessel by bamboo poles. When lifted, it traps the bait circling near the light forming a rectangular enclosure (Figure B1). By gathering the net from the stern forward, bait are crowded in a smaller

FIGURE B1. A BAITFISHING TECHNIQUE: THE BOUKI-AMI

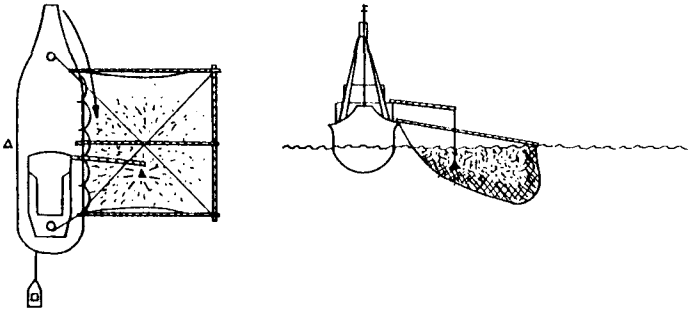
1. Attraction lights on



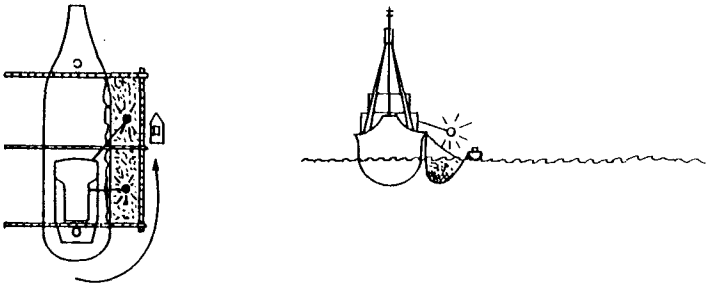
2. Checking the bait and setting the net



3. Concentrating the bait and hauling the net



4. Crowding the bait



Source: Hallier, Kearney and Gillett (1982).

pocket from where they can be scooped into plastic buckets and then transferred to the bait wells. Note if any other method is used (beach seine, or bait purchased from a local supplier).

Tuna fishing

The typical plan is to approach a school and chum (throw live bait into the water) schools. All hands are on deck and ready for action. The fishermen are stationed all around the stern and on the port side from midship all around the bow.

Fishing starts with either a strike on the trolling lines, which are then hauled, or, in a particularly active school, with catches on the poles. Water is sprayed from the fishing stations to hide the vessel and entice the fish to bite. The fishing master will then direct the chumming operation, controlling the amount used in function of the biting response. Figure B2 shows a typical bait boat with the fishing stations, and Figure B3 shows the pole-and-lines used. Fish will pile up on deck until the school stops biting.

Observer Duties

1. Daily activities

Although you may spend long periods at sea, the time you actually have to make your observations can be very short because of the nature of the fishing operation. Therefore you should get organised so as to get the most important information first and then go on to the next, as time permits.

Your most important duty is to give a detailed account of each day's activity. You have seen on page 30 an example of how to write your narrative diary on the events of a day's searching.

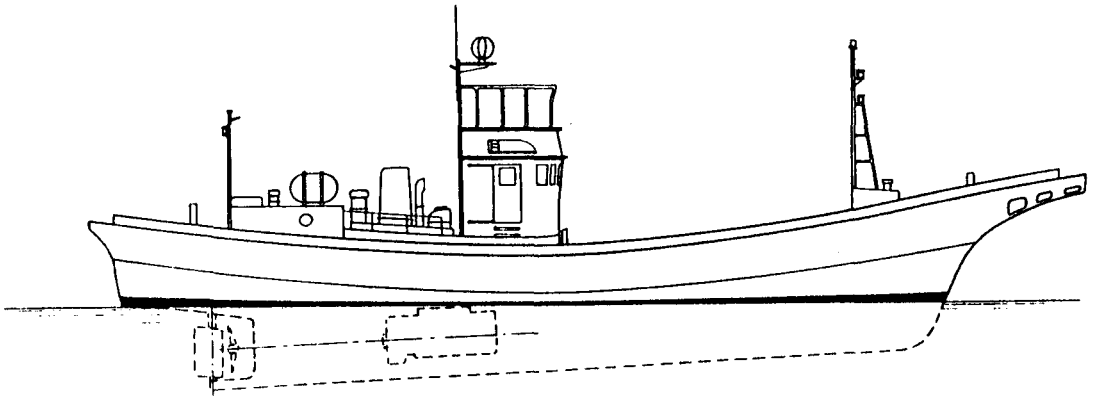
You should also fill out the observer daily log (see pages 35-37 for instructions and example). It asks for a detailed breakdown of the activities by half-hour intervals or every time something new begins (e.g. chasing, fishing), so try to keep a good watch. You are not expected to stand 12 hours' watch every day, so note carefully when you start and stop monitoring the activities each day.

You should follow the same format for the catch information. Include any observation of particular interest, mechanical problems resulting in a poor or zero catch, and more importantly, misreporting. Out of curiosity, the crew may leaf through your diary or ask to have a look at it. Therefore should you wish to keep any information confidential, you should think of writing it in your mother language.

Remember that we are also asking you to fill out a catch form (like the one filled out by the captain) from your own observations. It is especially important if the captain does not fill in his until the end of the trip; it will help, by comparing with your copy, to see if anything was left out or forgotten. (See pages 38 and 39.)

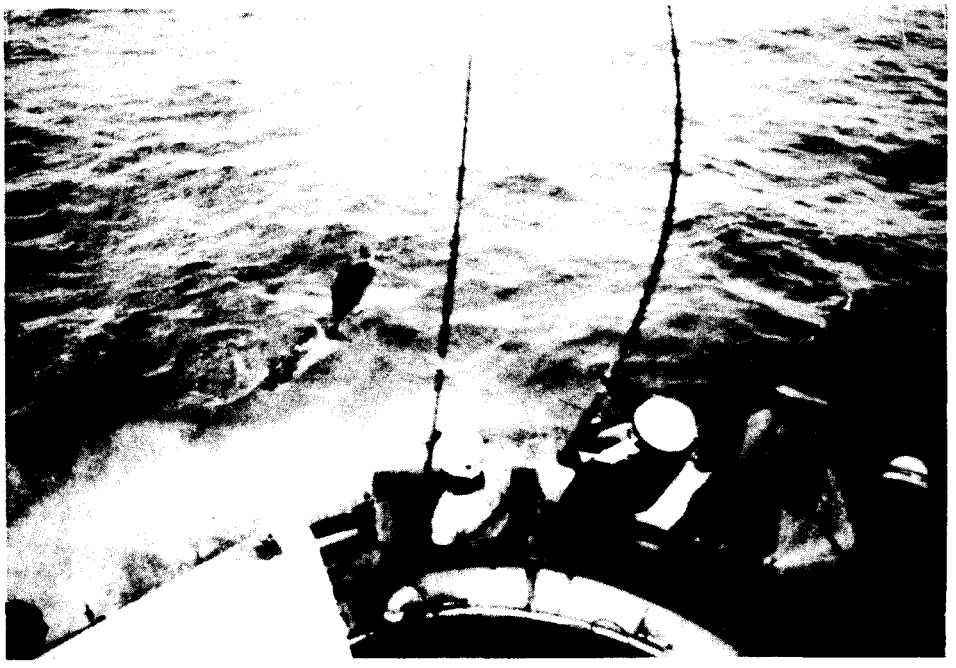
You should first try to get an estimate of total catch. The most knowledgeable persons to ask are the fishing master and the chief or

FIGURE B2. A TYPICAL JAPANESE POLE-AND-LINE BOAT



Source: FAO (1985).

FIGURE B3. POLING A SKIPJACK ON BOARD



Source: SPC Skipjack Survey and Assessment Programme.

refrigeration engineer. You should consult them after the catch has been loaded into the fish holds. By keeping a cumulative total, you will find out how close their estimate comes to the actual catch. Your total can also be checked against the carrying capacity of the vessel (either from the licence registration, the FFA Registry or the boat specifications).

The other items on the catch form that you should record are species composition and discards. Unlike purse seine catches, pole-and-line catches are much more selective and consist mostly of skipjack. We are not recommending any sampling at this time and again you should rely on the crew's estimates.

Discards are also often unreliably reported. Note important species, but also any undersized tuna that are discarded.

Finally, and only if instructed to do so, you may sample the catch for length frequency distribution (i.e. measure fish). Should you have been asked, you should try to take systematic samples (i.e. every 10th or 50th fish) as the fish are being moved from the fishing stations to the holds.

Sampling should only be attempted after all fishing activities have ceased. To do otherwise would expose you to possible injury (falling fish, flying hooks) and hinder fishing operations such as supplying the chumming tanks with bait from the live wells.

REFERENCES

FAO (1985). Definition and classification of fishery vessel types. Fishery Information, Data and Statistics Service and Fishing Technology Service (comps). FAO Fisheries Technical Paper, (267):63 p.

HALLIER, J.P., KEARNEY, R.E. and R.D. GILLETT (1982). Baitfishing methods used by the Skipjack Survey and Assessment Programme and recommendations on baitfishing techniques for the tropical Pacific. pp. 71-107. In Kearney, R.E. (ed.), Methods used by the South Pacific Commission for the survey and assessment of skipjack and baitfish resources. Tuna and Billfish Assessment Programme Technical Report No. 7, South Pacific Commission, Noumea, New Caledonia.

INSTRUCTIONS FOR FILLING OUT FORM D1 (POLE-AND-LINE OBSERVER DAILY LOG)

- PLEASE PRINT -

1. Vessel name - Print the name of the vessel from which the observations have been made.

2. Your name - Print your surname.

3. Date - The date of the observations (YYMMDD), e.g. 860112.

-----FOR THE REMAINDER OF THE FORM, FILL OUT ONE LINE AT EACH CHANGE OF ACTIVITY OR EVERY HOUR------

4. Time - Hour and minutes at which you observed the change in activity (searching, chasing a school, fishing or no operation) or at which you made this observation.

5. Position - Longitude and latitude where this observation is taking place.

6. Log - Log reading.

7. Activity - Write down the code describing the activity the vessel is engaged in at this time.

    1. Searching - At least one member of the crew is actively looking for tuna.

    2. Chasing - The vessel is changing course to investigate a school or a sign (e.g. birds).

    3. Fishing - The school chased is being chummed and/or trolling lines are set.

    4. No operation - The vessel is not engaged in any of these activities.

8. Lookout - The number of crew members participating in searching activities.

9. School sighted - The number of schools sighted by the crew since the last entry.

10. Chumming - If the vessel caught up with a school or fish signs (e.g. birds), is bait being used to try to entice the fish to bite? Y/N.

11. Catch - For each school chummed or fished write the catch (including zero) and weight range of skipjack, yellowfin and bigeye and write down the total fish catch out of that school, including discards.

Weight ranges are:

SJ (kg)	YF/BE (kg)
<2	<5
>2	5-15
2-4	15-30
2-6	<30
4-6	30-50
4-8	15-50
6-8	>50
>8	>80
?(unknown)	?

12. School type - Write down one or two codes best describing the school fished.

Unassociated
1. Foamer/boiler
2. Rippler/breezer
3. Birds only

Associated
4. Natural log/debris
5. Free-floating raft/payao
6. Anchored raft/payao
7. Animals (whales/sharks, etc.)

13. SST - Sea surface temperature at the time of the observation.

14. Beaufort - A number between 0 and 12 describing the wind and sea condition (see the Beaufort scale in Appendix F, page 70). This should be carried out only three times a day, e.g. 6h00, 11h00, 14h00.

15. Comment - The code of the comment describing the reasons for a no operation or a null catch.

1. In port
2. Bad weather
3. Breakdown
4. Transit
5. Out of bait
6. Boat full

POLE-AND-LINE OBSERVER DAILY LOG

VESSEL NAME: _____ YOUR NAME: _____ DATE: _____

TIME	POSITION				LOG	ACTIVITY	LOOK-OUT	SCHOOL SIGHTED	CHUMMING	SJ		YF		BE		TOTAL CATCH	SCHOOL TYPE	SST	BEAUFORT	COMMENT
	LAT	N/S	LONG	E/W						CATCH	WT. RANGE	CATCH	WT. RANGE	CATCH	WT. RANGE					

ACTIVITY:

Searching 1
Chasing 2
Fishing 3
No operation 4

SCHOOL TYPE:

Unassociated
Foamer/boiler.....1
Rippler/breezer 2
Birds only 3

Associated
Natural log/debris 4
Free floating raft/payao 5
Anchored raft/payao 6
Animals (whales/sharks, etc.) 7

COMMENT:

In port 1
Bad weather 2
Breakdown 3
Transit 4
Out of bait 5
Boat full 6

INSTRUCTIONS FOR COMPLETING DAILY TUNA CATCH RECORD

Long-range Pole-and-Line Vessels

(1) CATCH REPORT FOR WATERS OF - Give country in whose waters vessel is fishing, e.g. Papua New Guinea.

(2) VESSEL NAME - Give name in full, e.g. Hatsutori Maru No.5.

(3) COUNTRY OF REGISTRATION - e.g. Japan.

(4) REGISTRATION NUMBER - As registered in country of registration given in (3), e.g. TK1-970.

(5) GROSS REGISTERED TONNAGE - To nearest tonne, e.g. 254.

(6) YEAR - Give current calendar year, e.g. 1982.

(7) MONTH - Give month to which this catch return refers. Use numbers from 1-12 for January to December, e.g. 9 for September.

(8) LICENCE/PERMIT NUMBER - Give complete number of permit to fish in the waters of the country given in (1), e.g. PNG 82/1234.

(9) NAME OF CAPTAIN - Give name in full.

(10) CAPTAIN'S SIGNATURE - Must be signed by the Captain as the person accepting responsibility for the accuracy of the catch declaration.

(11a) DEPARTURE FROM PORT - Give full name of port from which this cruise started, e.g. Shimizu.

(11b) DATE - Give date of departure from (11a) with year, followed by month, followed by day, e.g. 81/8/16 for 16 August 1981.

(12a) ARRIVAL AT PORT - Give full name of port at which cruise is terminated, e.g. Yaizu.

(12b) DATE - Give date of arrival at (12a), year/month/day, e.g. 81/10/27 for 27 October 1981.

(13) NUMBER OF CREW - Give total number of officers and crew on board.

(14) DAY - Days are marked 1-31. Details should be entered for each day of the month spent in the waters of the country given in (1), e.g. if vessel commences fishing in Papua New Guinea waters on 23 August and leaves on 4 September, records should be made on one sheet for August, commencing day 23 and continuing to day 31, and a new sheet should then be used for September day 1 to day 4.

(15) NOON POSITION - Give latitude and longitude to nearest minute and add N or S for north or south latitude and E or W for east or west longitude.

(16) SKIPJACK - Catch in kilogrammes to the nearest kilogramme, e.g. 2,371 and average weight to the nearest .1 kilogramme, e.g. 4.2

(17) YELLOWFIN - As for skipjack.

(18) OTHER SPECIES - Give name of the dominant species only, e.g. rainbow runner, and give weight and size as for Skipjack.

(19) COMMENTS - If no catch is made, choose from the codes 1 to 6.

The completed form must be signed and a copy posted airmail immediately to the Fisheries Department of the country in whose waters fishing was carried out.

At the same time the original should be airmailed to the:

Tuna Programme Co-ordinator,
South Pacific Commission,
Post Box D5,
NOUMEA CEDEX,
New Caledonia.

LONG RANGE POLE AND LINE VESSEL - CATCH REPORT FOR WATERS OF .....

	NAME		YYMMDD
DEPARTURE FROM PORT		DATE	
ARRIVAL AT PORT		DATE	

VESSEL NAME _____ LICENSE/PERMIT NUMBER _____

COUNTRY OF REGISTRATION _____ NAME OF CAPTAIN _____

REGISTRATION NUMBER _____

GROSS REGISTERED TONNAGE _____

NUMBER OF CREW	

YEAR _____ MONTH _____ LICENCE/PERMIT HOLDER'S SIGNATURE _____

DAY	NOON POSITION				SKIPJACK		YELLOWFIN		OTHER SPECIES			COMMENTS
	LAT		LONG		CATCH (MT)	AV. WEIGHT (KG)	CATCH (MT)	AV. WEIGHT (KG)	SPECIES NAME	CATCH (MT)	AV. WEIGHT (KG)	
	DDMM	N S	DDDMM	E W								
1												( )
2												( )
2												( )
4												( )
5												( )
6												( )
7												( )
8												( )
9												( )
10												( )
11												( )
12												( )
13												( )
14												( )
15												( )
16												( )
17												( )
18												( )
19												( )
20												( )
21												( )
22												( )
23												( )
24												( )
25												( )
26												( )
27												( )
28												( )
29												( )
30												( )
31												( )
TOTAL												

NUMERICAL EXPRESSION OF COMMENTS

Comments column should be completed using the following numbers:-

1 A full day in transit between fishing grounds or to or from fishing grounds.

2 A full day not fishing due to breakdown.

3 A full day not fishing due to bad weather.

4 A full day carrying no bait or when returning to port.

5 A full day searching for fish with bait on board but not in transit.

6 Any other reason for no catch. Please specify -

.....

APPENDIX C

OPERATING PROCEDURES AND SAMPLING ON BOARD A LONGLINE VESSEL

Introduction

Longlining differs from the other two types of commercial exploitation for tuna seen in this manual in as much that it targets large individuals swimming at great depth. The entire operation is thus a function of the fishing master's knowledge of the fishing grounds. Indeed, the fish are not seen until they come on board.

The emphasis is also on quality versus quantity, in contrast to surface operation. You will therefore see every fish that comes on board. However, working conditions are difficult because of long hours and repetitive work.

Boats vary in size (Figure C1) and refrigeration capacity (i.e. freezing). It will be one of your duties to describe the one that you are on.

Fishing Operation

1. Location of suitable grounds

Searching for a longline operation is limited to steaming to grounds of known productivity. It is your responsibility to try to determine how the fishing master knows where to go. He may make his decision from experience, information from other vessels in the fleet, or from other factors, such as currents or temperature profiles. Patches of plankton concentration, evident on an echo sounder (deep scattering layer), are often associated with good fishing grounds and can be used to locate them. Note if the fishing master used the echo sounder for this purpose.

Deep swimming tuna also exhibit temperature preferences, and XBTs (expendable bathythermographs) are used to measure temperature at different depths. Note any temperature profile measured and the position of the measurement on the XBT form (page 55). This is also used to modify the fishing depth by changing the configuration of the gear. Hence note any change in configuration.

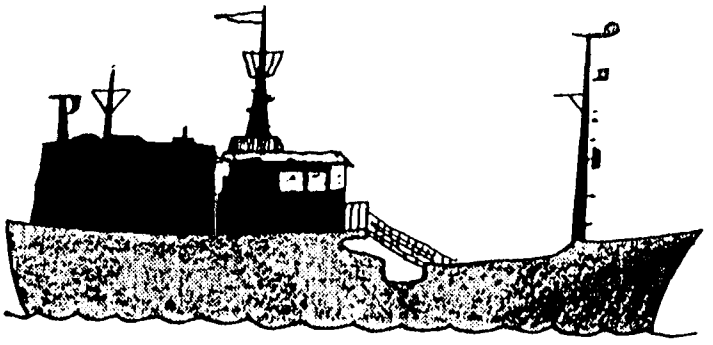
2. Fishing

Fishing consists of two operations: setting the line and hauling it. Two teams of fishermen rotate to ensure a continuous operation.

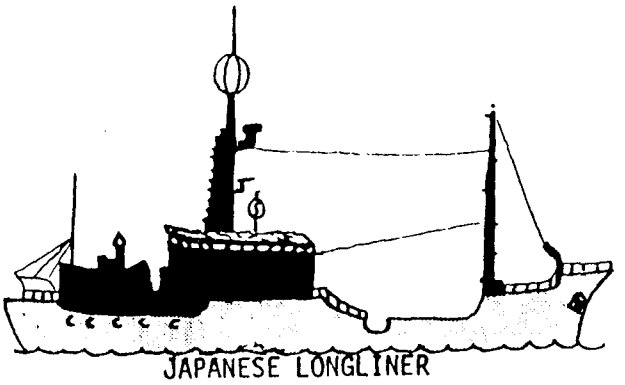
Setting

The longline is a continuous line laid out over about 45 miles of ocean. Note the time and position of the start and finish of each set. The line is supported by floats at fixed intervals and a varying number of hooks are attached on a branchline between these buoys. As the hooks are attached to the mainline, they are baited with frozen bait (saury, mackerel, squid). Figure C2 shows the configuration of a typical longline. By adjusting vessel speed, line throwing speed or intervals between floats, the fishing master changes the fishing depth and thus the target species. Note in which configuration these buoys and branchlines occur (i.e. number of branchlines, length of branchlines, length of floatline, distance between the floats or line laid between floats). Also note any known deliberate changes to go for bigeye rather yellowfin.

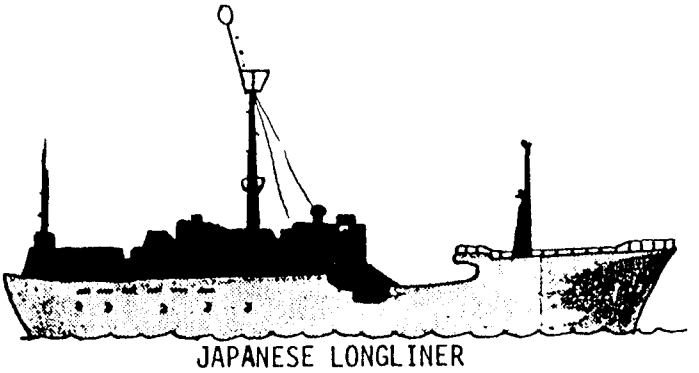
FIGURE C1. SOME PROFILES OF LONGLINERS OPERATING IN THE SOUTH PACIFIC REGION



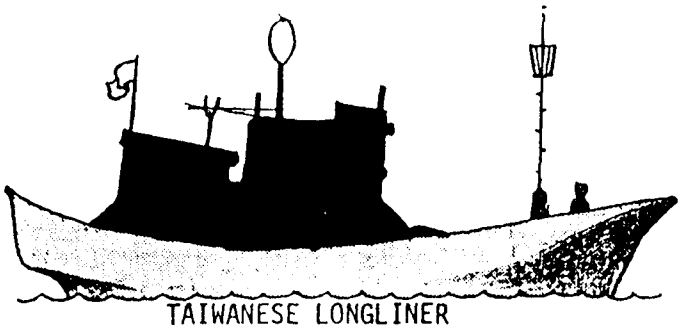
JAPANESE OR KOREAN LONGLINER



JAPANESE LONGLINER



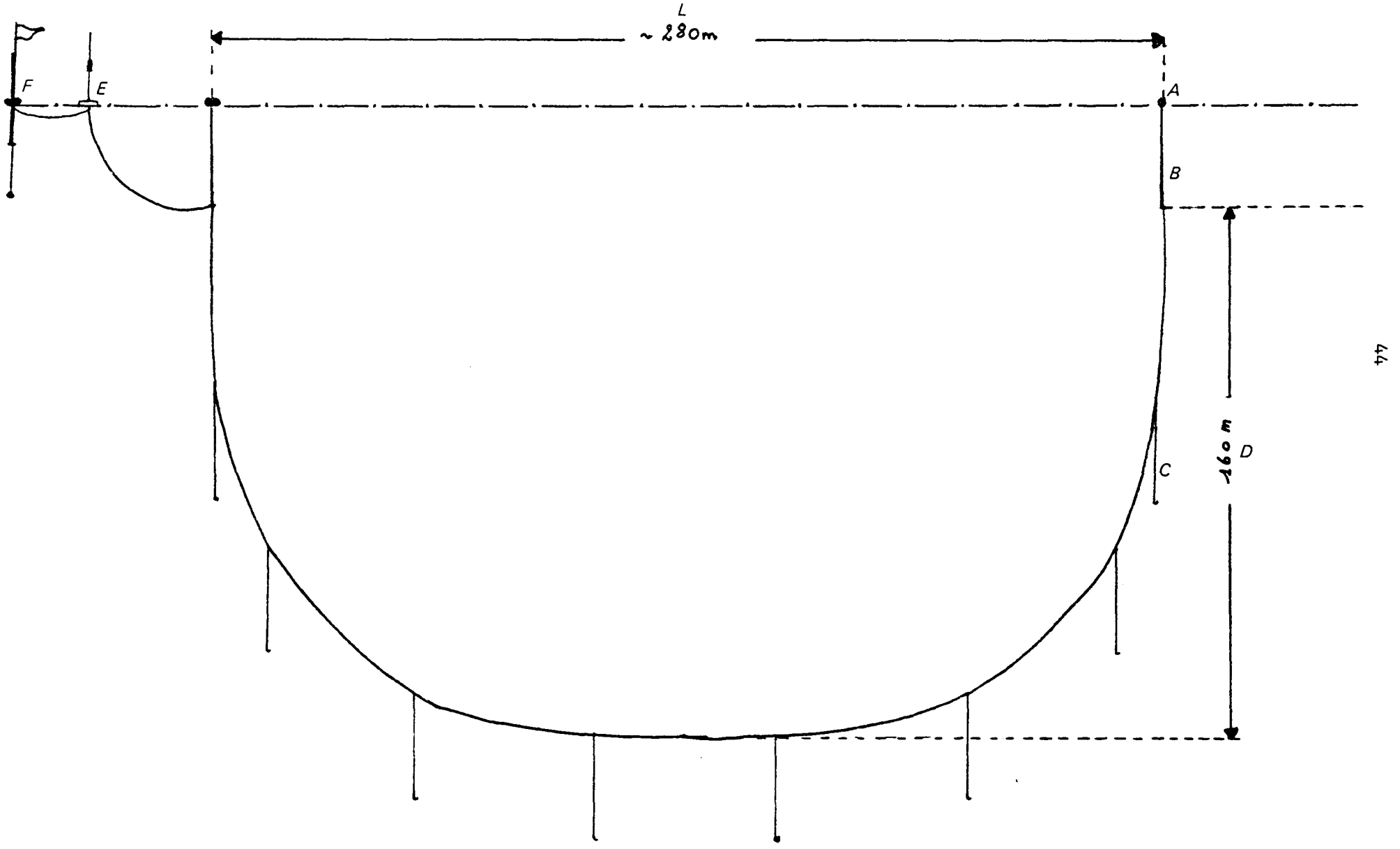
JAPANESE LONGLINER



TAIWANESE LONGLINER

Source: Drawings reproduced with kind permission of Mr Don Aldous, Forum Fisheries Agency, Honiara, Solomon Islands.

FIGURE C2. CONFIGURATION OF A LONGLINE



Hauling

The hauling operation is obviously the reverse of the setting. The line is picked up and stored in large tanks. Note at what time hauling begins and if there is a relation with the species targeted (i.e. fishing for bigeye, the haul will begin later in the day). As they come up, floats and hooks are taken off and readied for the next set. Any fish caught are gutted on board, cleaned and dressed for the freezer or ice immediately.

Usually, billfish and yellowfin come from rather shallow hooks, then come albacore, and bigeye appear to be the deepest swimming tuna. Many incidental species are caught along with a lot of sharks (Appendix D).

Hauling operations usually last more than twice as long as a set.

Some boats will weigh each piece, usually in various states of evisceration, depending on market preferences, e.g.

Albacore - whole
Yellowfin and bigeye - gilled and gutted
Billfish - gilled and gutted - bill and fins removed
Shark and spearfish - fillets

But many rely on visual estimates (usually accurate within 10 per cent!). Note the procedure followed on your vessel.

3. Sampling

Sampling the catch on a longliner can be done systematically. Since, typically, hauling lasts more than 10 hours straight, we do not ask you to record every fish caught. Instead, we ask you four times during the operation to record the catch for 100 consecutive hooks.

Try to do it about every three hours (4 times in 12 hours). Use a plastic slate and pencil to record the information. Start at one float, recording the time. Then for 100 hooks, which are numbered on your sample sheet, record the hook number in the basket (i.e. the number of hooks since the last float) and if there is either bait left on the hook and which type if more than one type is used (e.g. squid or mackerel: record S or M), or a fish caught and which species. Measure the fork length of all tuna and billfish caught. On your sample sheet there is a diagram on how to measure a fish. Finally, if the fish is spoiled for any reason (e.g. shark bite), which will reduce its commercial value, write it down in the comment column. Similarly, discards should be written down (e.g. sharks) in the same column.

Refer to the instructions and example on pages 51 and 52. after you have filled it out.

You should repeat the operation four times. Keep track of the time of day, date and the number of samples for that day. Also note any unusual events that occur outside your sampling time (e.g. unusual species, mechanical problems, etc.).

Observer Duties

Observer duties on a longliner may be considered easier than on a purse seine or pole-and-line vessel because most of the information comes from direct observation with little guesswork. However, because of long working hours there may be less free time to copy the information from your plastic slates to your sample sheets. Your priorities are thus to keep a complete narrative diary and to recopy the daily sample sheets. If time permits, fill out the SPC observer daily log (see pages 47 and 48) and the catch form (one line per day) (see pages 49 and 50). If not, you should have all the necessary information to do so later.

Then, wash your equipment and get ready for the next day's sampling.

INSTRUCTIONS FOR FILLING OUT FORM D3 (LONGLINE OBSERVER DAILY LOG)

- PLEASE PRINT -

1. Vessel name - The name of the vessel from which the information has been collected.

2. Your name - Print your surname.

3. Date - The date of the day the information has been collected on (YYMMDD), e.g. 860108.

4. Set - (a) Time BEG/END. A set is the operation when the line is laid out. Time when setting begins and time when setting ends.

   (b) LONG E/W LAT N/S. Write the position of the point where the set began and the position where it ended.

5. Bait - The amount of bait used for the set. The crew usually keeps track of the number of cases used (N). Find out the weight of the case (W) then the amount of bait used is (WxN).

6. XBT (expendable bathythermograph) - This is a device used to measure temperature at different depths. You will be recording the information on a separate sheet; just indicate if the device was used by ticking the box.

7. No. of coils - The number of units set.

8. No. of br. lines/coil - The number of hooks per unit.

9. Distance between br. lines - Line throwing speed X(No. br. line/coil + 1).

10. Ship speed - Average speed of the ship while setting.

11. Haul - A haul is the operation when the line is picked up.

    (a) Time BEG/END. Time when hauling begins and hauling ends.

    (b) LONG E/W LAT N/S - Position where hauling begins and position where hauling ends.

12. Summary of sampling - From your sampling sheet total the number of each species caught at each hook and write the total on this form.

- FORM D3 -

L O N G L I N E O B S E R V E R D A I L Y L O G

VESSEL NAME: _____ YOUR NAME: _____ DATE: _____

	S E T					BAIT (KG)	X B T	NO. OF COILS	NO. OF BR. LINES/ COILS	DISTANCE BETWEEN BR. LINES	SHIP SPEED (KNT)		H A U L				
	TIME	LAT	N/S	LONG	E/W								TIME	LAT	N/S	LONG	E/W
BEG												BEG					
END												END					

SUMMARY OF SAMPLING												
NO. OF FISH CAUGHT AT EACH BRANCHLINE												
BR. LINE NO.	1	2	3	4	5	6	7	8	9	10	11	12
YFT												
BET												
ALB												
STM												
BLM												
BKM												
SAF												
SWF												
SKJ												
SHK												

OBSERVATIONS: _____

_____

_____

_____

INSTRUCTIONS FOR COMPLETING DAILY TUNA CATCH RECORD

Longline Vessels

(1) CATCH REPORT FOR WATERS OF - Give country in whose waters vessel is fishing, e.g. Papua New Guinea.

(2) VESSEL NAME - Give name in full, e.g. Nankai Maru No.18.

(3) COUNTRY OF REGISTRATION - e.g. Japan.

(4) REGISTRATION NUMBER - As registered in country of registration given in (3), e.g. TK1-970.

(5) GROSS REGISTERED TONNAGE - To nearest tonne, e.g. 254.

(6) LICENCE/PERMIT NUMBER - Give complete number of permit to fish in the waters of the country given in (1), e.g. PNG 82/1234.

(7) NAME OF CAPTAIN - Give name in full.

(8) YEAR - Give current calendar year, e.g. 1982.

(9) MONTH - Give month to which this catch return refers. Use numbers from 1-12 for January to December, e.g. 9 for September.

(10) NUMBER OF HOOKS/BASKETS - If the number of hooks per basket varies, the average should be given.

(11) DISTANCE BETWEEN FLOATS - The average distance between floats should be given in metres.

(12) LENGTH OF FLOAT LINE - Give average length in metres.

(13) LENGTH OF BRANCH LINE - Give average length in metres.

(14) BAIT USED - Give common name - e.g. saury or squid.

(15) LICENCE/PERMIT HOLDER'S SIGNATURE - Must be signed by the licence/permit holder as the person accepting responsibility for the accuracy of the catch declaration.

(16a) DEPARTURE FROM PORT - Give full name of port from which this cruise started, e.g. Shimizu.

(16b) DATE - Give date of departure from (11a) with year, followed by month, followed by day, e.g. 81/8/16 for 16 August 1981.

(17a) ARRIVAL AT PORT - Give full name of port at which cruise is terminated, e.g. Yaizu.

(17b) DATE - Give date of arrival at (12a), year/month/day, e.g. 81/10/27 for 27 October 1981.

(18) NUMBER OF CREW - Give total number of officers and crew on board.

(19) DAY - Days are marked 1-31. Details should be entered for each day of the month spent in the waters of the country given in (1), e.g. if vessel commences fishing in Papua New Guinea waters on 23 August and leaves on 4 September, records should be made on one sheet for August, commencing day 23 and continuing to day 31, and a new sheet should then be used for September day 1 to day 4.

(20) NOON POSITION - Give latitude and longitude to nearest minute and add N or S for north or south latitude and E or W for east or west longitude.

(21) NUMBER OF HOOKS - The total number of hooks set should be given for each day.

(22) SEA SURFACE TEMPERATURE - e.g. 27.5.

(23) NUMBERS OF FISH and TOTAL WEIGHTS - The number and total weight for each species. The total weight for each species for that month must also appear at the bottom of the page.

(24) OTHER SPECIES - Name, number and total weight of the dominant other species should be given.

(25) DISCARDS - All fish which are caught but not maintained on board must be declared to the nearest kilogramme.

(26) COMMENTS - Comments are zero (0) when the gear is in the water, one (1) when there is no operation and two (2) when in port.

The completed form must be signed and a copy posted airmail immediately to the Fisheries Department of the country in whose waters fishing was carried out.

At the same time the original should be airmailed to the:

Tuna Programme Co-ordinator,
South Pacific Commission,
Post Box D5.
NOUMEA CEDEX,
New Caledonia.

LONGLINE VESSEL - CATCH REPORT FOR THE WATERS OF .....

VESSEL NAME _____
COUNTRY OF REGISTRATION _____
REGISTRATION NUMBER _____
GROSS REGISTERED TONNAGE _____
LICENCE/PERMIT NUMBER _____
NAME OF CAPTAIN _____

NUMBER OF HOOKS/BASKETS _____
DISTANCE BETWEEN FLOATS (M) _____
LENGTH OF FLOAT LINE (M) _____
LENGTH OF BRANCH LINES (M) _____

BAIT USED (Species)	1	2

	NAME		YYMMDD
DEPARTURE FROM PORT		DATE	
ARRIVAL AT PORT		DATE	
NUMBER OF CREW			

YEAR _____ MONTH _____ LICENCE/PERMIT HOLDER'S SIGNATURE _____

Comments Code
1. Days not fishing
2. In port

DAY	NOON POSITION				NUMBER OF HOOKS	SEA SURFACE TEMPERATURE	Albacore		Bigeye		Yellowfin		Bluefin		Striped marlin		Blue marlin		Black marlin		B.B. Sword fish		Sailfish		Shark		OTHER SPECIES		DISCARDS		COMMENTS
	LAT		LONG				NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	NO.	TOT. WT. (KG)	TUNA (KG)	OTHERS (KG)	
	DDMM	N S	DDDMM	E W																											
1																															
2																															
3																															
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29																															
30																															
31																															
TOTAL																															

INSTRUCTIONS FOR FILLING OUT FORM E3 (LONGLINE SAMPLING SHEET)

- PLEASE PRINT -

1. Vessel name - The name of the vessel from which the information has been collected.

2. Your name - Print your surname.

3. Date - Sampling date (YYMMDD), e.g. 860108.

4. Sample No. - The number of the sample.

5. Hour - Time at which the sample was collected.

6. HK No. - You will have to sample 100 hooks for each sample. Write the number of the branchline.

7. SP - For each branchline there will either be two fish attached or none at all. If there is, write the three-letter code for that species. If not, there may still be bait attached. If so, write down the species of bait. If not, just put a minus (-) sign.

8. LCF - If there is a fish attached, write an estimate of its size.

9. OBS - If there is a fish attached, write down any marks that would cause the crew to discard it, e.g. shark bite.

- FORM E3 -

L O N G L I N E S A M P L I N G S H E E T

VESSEL NAME: _____ YOUR NAME: _____ DATE: _____

SAMPLE NO.: _____ HOUR: _____

HK NO.	BR. LINE NO.	SP	LCF	OBS.	HK NO.	BR. LINE NO.	SP	LCF	OBS.	HK NO.	BR. LINE NO.	SP	LCF	OBS.	HK NO.	BR. LINE NO.	SP	LCF	OBS.
1					26					51					76				
2					27					52					77				
3					28					53					78				
4					29					54					79				
5					30					55					80				
6					31					56					81				
7					32					57					82				
8					33					58					83				
9					34					59					84				
10					35					60					85				
11					36					61					86				
12					37					62					87				
13					38					63					88				
14					39					64					89				
15					40					65					90				
16					41					66					91				
17					42					67					92				
18					43					68					93				
19					44					69					94				
20					45					70					95				
21					46					71					96				
22					47					72					97				
23					48					73					98				
24					49					74					99				
25					50					75					100				

LIST OF COMMON LONGLINE GEAR

Basket. The portion of line between two floats, including the branchlines attached to it at regular intervals. Shallow longlines will typically have around 6 branchlines per basket, while deep ones may have up to 12 branchlines per basket. May also be called a coil.

Beacon. Radio beacon buoys placed on the line to help relocate it and indicate its orientation.

Branchline. A length of line clipped onto the mainline at regular intervals. It is made up of a clip, a length of serving, a wire leader and a baited hook.

Branch reel. Hydraulic winch used to coil the branchlines.

Floats. Buoys supporting the mainline between each basket.

Float line. Line of variable length which attaches the float to the mainline.

Hoist. Hydraulic hoist used to haul sharks on board vessel.

Hooking master. A timer which produces acoustic signals and regulates line thrower rpm's to determine the interval between branchlines. It also keeps track of the number of baskets.

Light floats. Floats equipped with a battery-operated light to help locate the longline at night.

Line hauler. Main winch used to haul the lines. Continuously operated, one crew member can slow it down with a brake on upcoming branchlines or floatlines.

Line thrower. A mechanical roller with adjustable rpm's mounted on the stern. It is the gear used to lay the line.

Mainline. A 6 mm braided line which constitutes the main part of the longline. Typically, it is more than 100 km in length.

Slow conveyer. Conveyer belt on which the mainline piles up before it is sent back to the storage tanks. At this time the line may be untangled, spliced or checked for wear.

Storage tank. The area on the upper deck where the mainline is stored.

INSTRUCTIONS FOR FILLING OUT THE XBT OBSERVATION FORM

- PLEASE PRINT -

1. Vessel name - The name of the vessel from which the observation was made.

2. Date - The date of the observation.

3. Time of day - The time of the observation.

4. XBT No. - The number of the observation (i.e. how many observations have you recorded so far on this trip).

5. Latitude/Longitude - The position in degrees and minutes (e.g. 2335S, 18022E).

Then if you cannot get the tracing on the chart of the XBT recorder, indicate on this form the sea surface temperature and the depth at each degree (e.g. 28.7 SST, 28° at x metres, 27° at y metres, 26° at z metres, etc.).

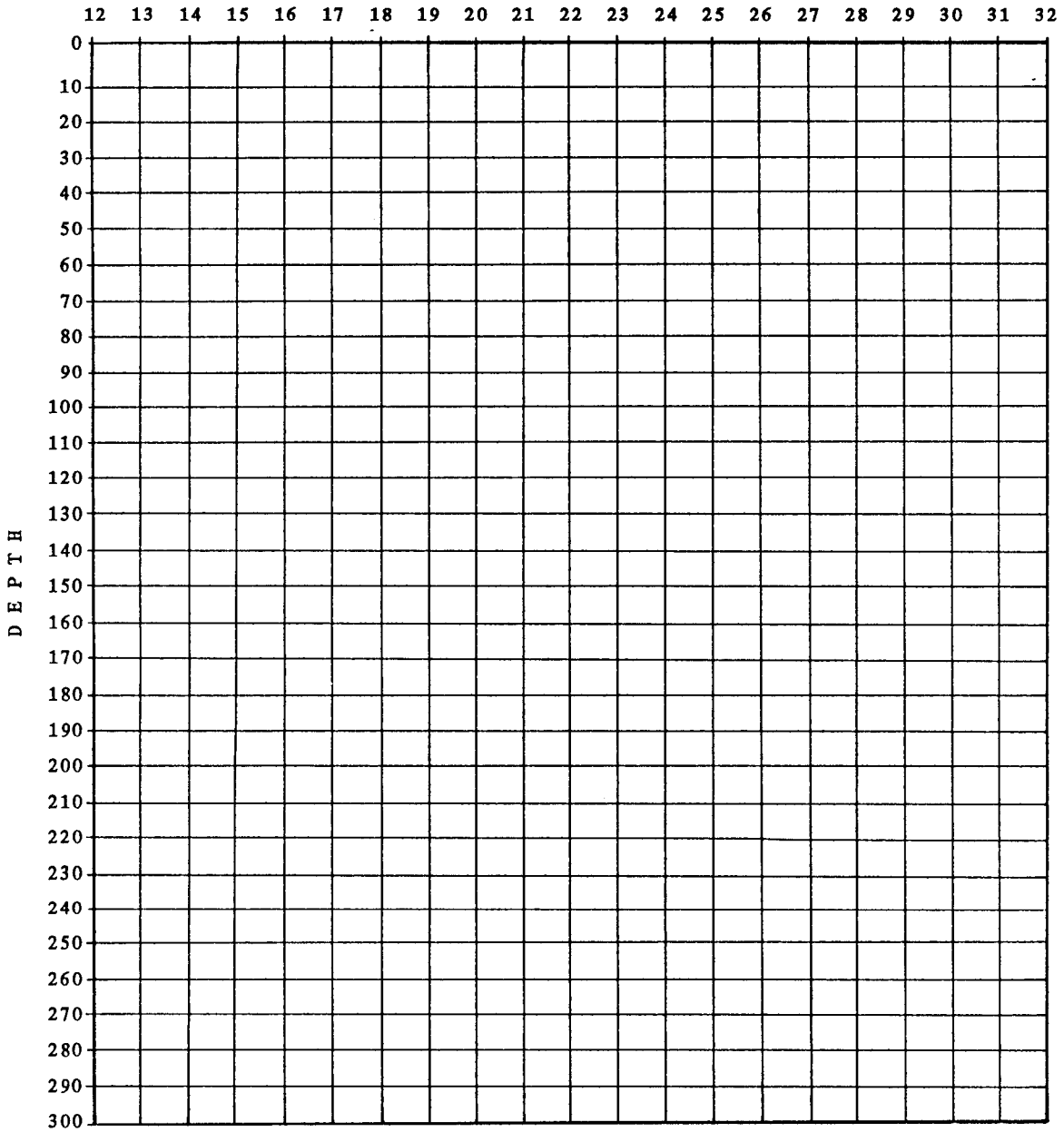
XBT OBSERVATION FORM

VESSEL NAME: _____ XBT NO.: _____

DATE: _____ LATITUDE: _____

TIME OF DAY: _____ LONGITUDE: _____

TEMPERATURE



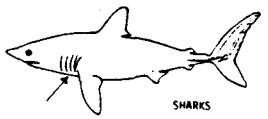
APPENDIX D

KEY TO OCEANIC SPECIES CAUGHT BY PURSE SEINE, POLE-AND-LINE AND LONGLINE VESSELS

Source: Russo, J.L. (1981). Field guide to fishes commonly taken in longline operations in the western North Atlantic Ocean. National Technical Information Service, NMFS, Seattle. 54 p.

KEY TO THE GROUPS OF FISHES COVERED IN THIS GUIDE

5 to 7 lateral gill openings.



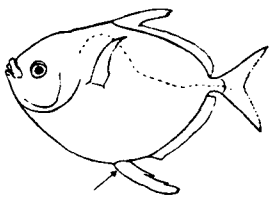
SHARKS

Single gill opening.

One dorsal fin.

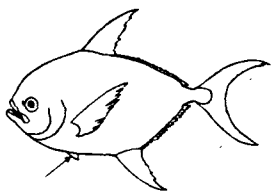
Dorsal fin originates posterior to head.

Pelvic fin noticeably more than twice as long as longest anal ray.



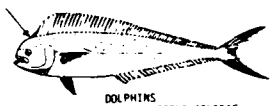
OPAH
Lampris guttatus

Pelvic fin much shorter or at most as long as longest anal ray.



POMFRETS
FAMILY: BRAMIDAE

Dorsal fin originates over head.



DOLPHINS
FAMILY: CORYPHAENIDAE

Two dorsal fins.

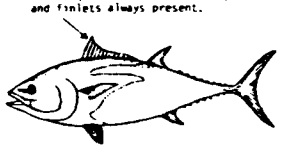
Second dorsal fin without spines or rays (adipose fin).

LANCETFISHES
FAMILY: ALEPISAURIDAE

Second dorsal fin composed of fin rays.

Upper jaw about equal in length to lower jaw.

Anterior margin of first dorsal fin much higher than posterior margin; and finlets always present.



TUNA AND MACKEREL-LIKE FISHES
FAMILY: SCOMBRIDAE

Anterior margin of first dorsal fin usually not much higher than posterior margin; if higher finlets not present.

Distance between last ray in second dorsal fin and origin of caudal fin much greater than base of second dorsal fin.

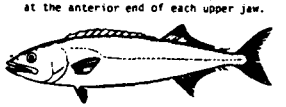
BARRACUDA
FAMILY: SPHYRAENIDAE

Distance between last ray in second dorsal fin and origin of caudal fin much less than base of second dorsal fin.

Teeth in upper jaw in one row, or form a large patch of several indistinct rows.

JACKS
FAMILY: CARANGIDAE

Teeth in upper jaw in 2 rows, a second inner row of 3 or 4 teeth is present at the anterior end of each upper jaw.



SNAKE MACKERELS
FAMILY: GEMPLYIDAE

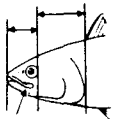
BILLFISHES
FAMILIES: XIPHIIDAE AND ISTIOPHORIDAE

KEY TO THE GENERA OF SCOMBRIDAE COVERED IN THIS GUIDE

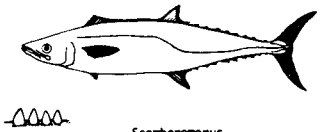
Snout about as long as rest of head; gill rakers absent; 21 or more spines in first dorsal fin; posterior end of maxilla concealed under preorbital bone.

Acanthocybium solandri
Wahoo

Snout much shorter than rest of head; gill rakers present; 20 or fewer spines in first dorsal fin; posterior end of maxilla exposed.



Teeth in jaws flat and compressed; corselet of scales not well developed, not extending past base of pectoral fin.

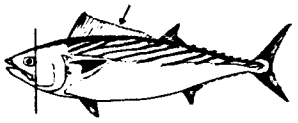


Scomberomorus
Spanish mackerels
(see generic key)

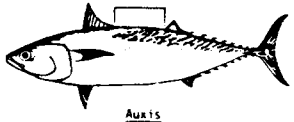
Teeth in jaws slender, conical hardly compressed; corselet of scales well developed, extending beyond base of pectoral fin.

Maxilla short, extending to a vertical under or anterior to the posterior margin of the pupil; first dorsal fin with a distinctly concave margin.

Maxilla long, extending to a vertical at or behind the posterior margin of the orbit; first dorsal fin with a more or less straight margin



Sarda sarda
Bonito

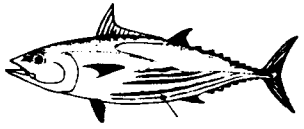


Auxis
Frigate and Bullet tunas
(see generic key)

Two dorsal fins separated by a large interspace, longer than or equal to the base of the first dorsal fin base; interpelvic process composed of a single large lobe.

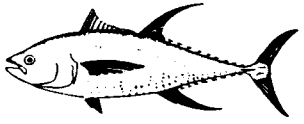
Two dorsal fins separated by a narrow interspace, much shorter than the base of the first dorsal fin; interpelvic process composed of two small lobes.

Gill rakers 53 to 63 on first arch; 3 to 5 prominent dark longitudinal stripes on belly.



Katsuwonus pelamis
Skipjack tuna

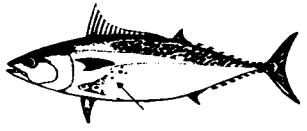
Gill rakers 19 to 45 on first arch; no dark longitudinal stripes on belly.



Body covered with very small scales behind corselet; no black spots on body; 30 to 36 pectoral fin rays.

Thunnus
Tunas (see generic key)

Body naked behind corselet; black spots usually present between pectoral and pelvic fin bases; fewer than 30 pectoral fin rays.

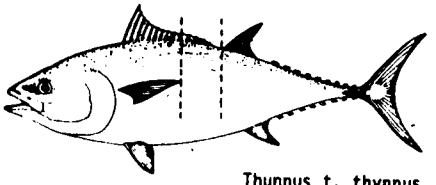


Euthynnus alletteratus
Little tunny

KEY TO THE SPECIES OF *THUNNUS* OCCURRING IN THE AREA

Total gill rakers on first arch 33 or less; pectoral fin long, reaching at least to the space between the first and second dorsal fins.

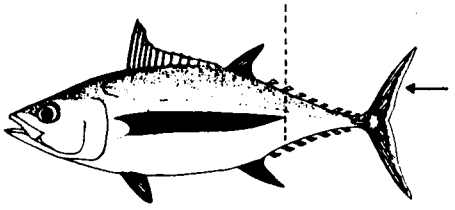
Total gill rakers on first arch 33 to 43; pectoral fin short, not reaching beyond the base of the first dorsal fin.



Thunnus t. thynnus
Bluefin tuna

Posterior margin of caudal fin white; body deepest at a point near the origin of the second dorsal and anal fins; pectoral fin extends beyond the second dorsal fin, usually to a point under the second dorsal finlet.

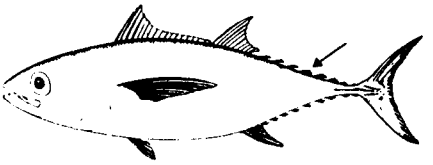
Caudal fin without a white posterior margin; body deepest at a point anterior to the origin of the second dorsal and anal fins; pectoral fin does not extend past second dorsal fin.



Thunnus alalunga
Albacore

Total gill rakers on first arch more than 25; finlets bright yellow with black margins.

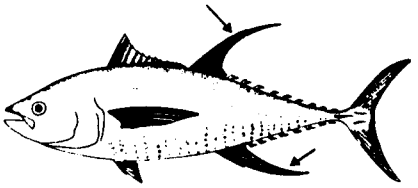
Total gill rakers on first arch 25 or less; finlets dusky with a trace of yellow.



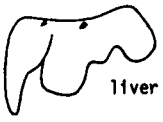
Thunnus atlanticus
Blackfin tuna

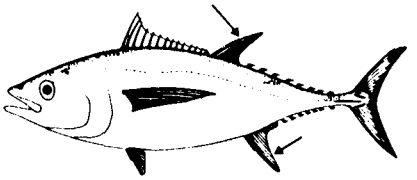
Dorsal and anal fins very long in large specimens, becoming well over 20% of fork length; striations not present on ventral surface of liver.

Dorsal and anal fins not very long in large specimens, less than 20% of fork length; striations present on ventral surface of liver.



Thunnus albacares
Yellowfin tuna



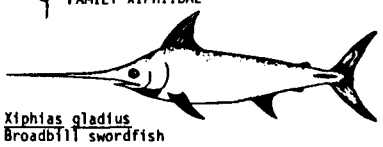


Thunnus obesus
Bigeye tuna

KEY TO THE ADULTS OF SPECIES OF BILLFISHES
(FAMILIES: ISTIOPHORIDAE AND XIPHIIDAE) OCCURRING IN THE AREA

Pelvic fins absent; gill membranes united to isthmus anteriorly, but free from each other.

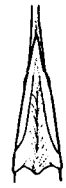
FAMILY XIPHIIDAE



Xiphias gladius
Broadbill swordfish

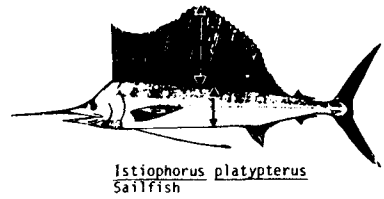
Pelvic fins present; gill membranes united to each other along entire ventral surface.

FAMILY ISTIOPHORIDAE



First dorsal fin not sail-like, lower to slightly higher than body depth at mid-body; pelvic fins about as long as pectoral fins.

First dorsal fin sail-like, much higher than body depth at mid-body; pelvic fins much longer than pectoral fins, extending almost to anus.

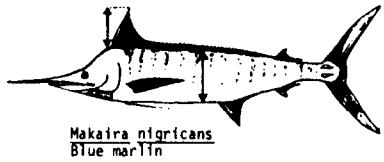


Istiophorus platypterus
Sailfish

Anterior part of first dorsal fin slightly higher than or nearly equal to body depth at mid-body; tips of first dorsal, first anal and pectoral fins more or less rounded.

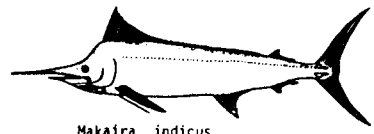
Anterior part of first dorsal fin lower than body depth at mid-body; tips of first dorsal, first anal and pectoral fins pointed.

Pectoral fins movable, can be folded back along sides of body; about 15 vertical bars of blue spots on sides of body.



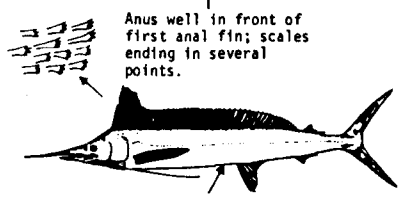
Makaira nigricans
Blue marlin

Pectoral fins not movable, can not be folded back along sides of body; no vertical bars on sides of body.



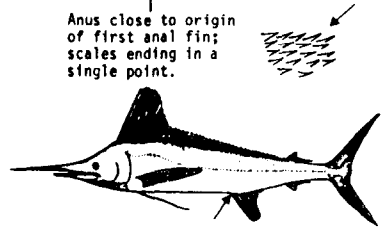
Makaira indicus
Black marlin

Anus well in front of first anal fin; scales ending in several points.



Tetrapturus pfluegeri
Longbill spearfish

Anus close to origin of first anal fin; scales ending in a single point.



Tetrapturus albidus
White marlin

MARLIN CHARACTERISTICS

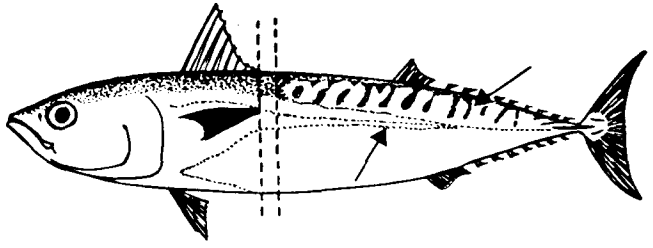
Character	BLACK	BLUE	STRIPED
Lateral line	straight, but not usually visible	two or more large loops; very clear in small fish	straight
Pectoral fin	rigid and not retractable, except in some small fish	retractable	retractable
1st dorsal fin	short, less than half body depth	medium height; 1/2 - 3/4 body depth	high; equal to body depth
2nd dorsal fin	begins in front of 2nd anal fin	begins slightly behind 2nd anal fin	begins slightly behind 2nd anal fin
1st anal fin	short, half body depth	medium, two-thirds body depth	high, 3/4 to equal to body depth
Vertical bars	rarely present; occasionally seen in smaller fish	present; variable in clarity	present

Note: No one character should be used to identify marlin; at least two, and preferably more, should be used together, as there is a certain amount of variation in all characters.

Source: LEWIS, A.D. and B.R. SMITH (1977). A brief guide to the tunas and billfish of Papua New Guinea. Prepared for the 2nd PNG National Gamefishing Titles, Finschhafen, April 8th-10th 1977. Fisheries Research Station, Kanudi, Papua New Guinea.

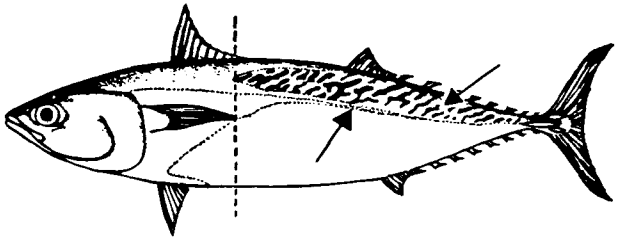
KEY TO THE SPECIES OF AUXIS OCCURRING IN THE AREA

Posterior part of corselet wide, 6 to 20 scales wide under the origin of the second dorsal fin; vertical from scaleless area above corselet not reaching tip of pectoral fin; dark stripes on back nearly vertical.



Auxis rochei
Bullet tuna

Posterior part of corselet narrow, not more than 5 scales wide under the origin of the second dorsal fin; vertical from scaleless area above corselet reaching tip of pectoral fin; dark stripes on back oblique, not vertical.



Auxis thazard
Frigate tuna

KEY TO THE SPECIES OF JACKS COVERED IN THIS GUIDE

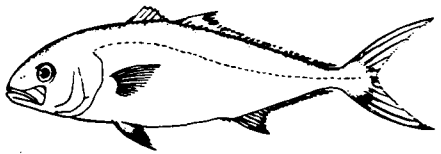
Scutes absent on caudal peduncle

Dorsal and anal fins followed by a single **finlet.**

Elagatis bipinnulata
Rainbow runner

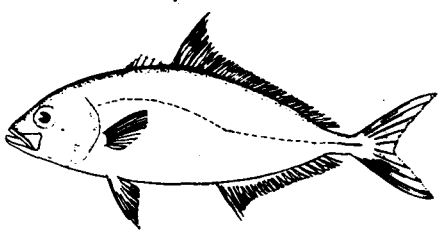
No finlets present after dorsal and anal fins.

Maximum body depth less than one third fork length.



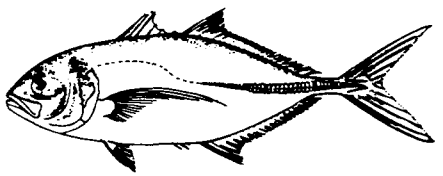
Seriola dumerili
Greater Amberjack

Maximum body depth more than one third fork length.



Seriola rivoliana
Almaco jack

Scutes present on caudal peduncle

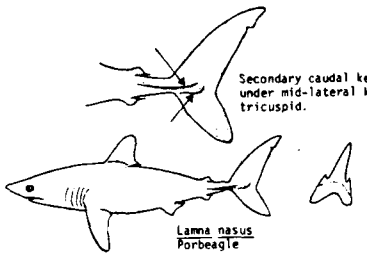


Caranx crysos
Blue runner

KEY TO THE SHARKS COVERED IN THIS GUIDE

Keels present on caudal peduncle.

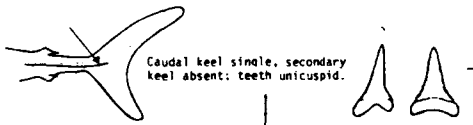
Secondary caudal keel present under mid-lateral keel; teeth tricuspid.



Lamna nasus
Porbeagle

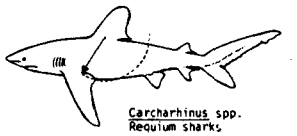
Keels absent from caudal peduncle.

Caudal keel single, secondary keel absent; teeth unicuspid.



Head subconical, only moderately depressed.

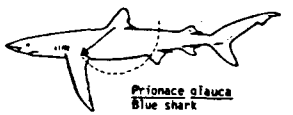
Carcharhinus spp.
Requium sharks



Midpoint of first dorsal fin (at its base) nearer to pectoral axil than to origin of pelvic fin.

Midpoint of first dorsal fin (at its base) is considerably nearer to the origin of the pelvic fins than to the axil of the pectoral fins.

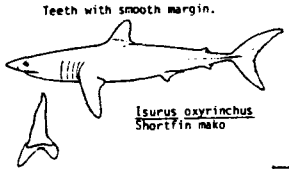
Prionace glauca
Blue shark



Head greatly depressed dorsoventrally, eyes and nostrils extended laterally from mid-line on "hammer" or "bonnet."

Pectoral fin short, length much less than distance from tip of snout to pectoral fin origin.

Teeth with smooth margin.



Isurus oxyrinchus
Shortfin mako

Teeth with serrate margin.

Eyes with nictitating membrane; 5th gill opening behind origin of pectoral fins.

Galeocerdo cuvier
Tiger shark

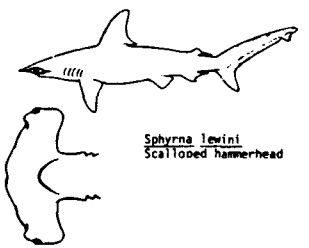
Eye without nictitating membrane; 5th gill opening in front of origin of pectoral fins.

Carcharodon carcharias
White shark

Pectoral fin long, length about equal to distance from tip of snout to pectoral fin origin.

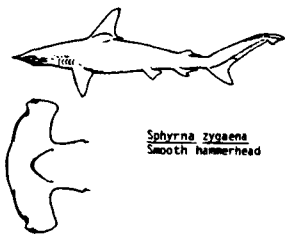
Isurus paucus
Longfin mako

Anterior margin of head scalloped, concave at mid-line.



Sphyrna lewini
Scalloped hammerhead

Anterior margin of head rounded, convex at mid-line.

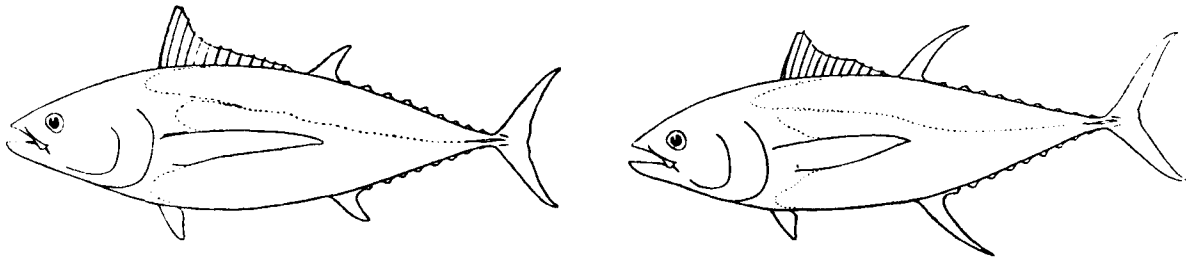


Sphyrna zygaena
Smooth hammerhead

APPENDIX E

DIFFERENCES BETWEEN SMALL YELLOWFIN AND BIGEYE

Source: Gillett, R.D. (1986). Observer trip on United States purse seine vessel (November-December 1984). Tuna and Billfish Assessment Programme Technical Report No. 15, South Pacific Commission, Noumea, New Caledonia.



Character	Bigeye	Yellowfin
Body outline	Dorsal outline from tip of snout to base of caudal peduncle almost a smooth arc; ventral outline from tip of snout to base of caudal peduncle almost a smooth arc.	Dorsal outline from secondary dorsal fin to base of caudal peduncle somewhat flat; ventral outline from anal fin to base of caudal peduncle somewhat flat.
Pectoral fin	Pectoral fin extends to the posterior end (insertion) of anal fin.	Pectoral fin extends to the anterior end (origin) of the anal fin.
Gas bladder	Distended; extends along the roof of body cavity to within 2 cm of anal pore; highly visible.	Deflated or slightly inflated; extends along roof of body cavity to a point more than 6 cm from anal pore; not obvious.

APPENDIX F

ADDITIONAL USEFUL INFORMATION

BEAUFORT WIND SCALE
(For an effective height of 10 metres above sea level)

Beaufort Number	Descriptive Term	Mean wind speed equivalent in knots	Deep Sea Criterion	Probable mean wave height* in metres
0	Calm	0-1	Sea like a mirror	-
1	Light air	1-3	Ripples with the appearance of scales are formed, but without foam crests	0.1 (0.1)
2	Light breeze	4-6	Small wavelets, still short but more pronounced; crests have a glassy appearance and do not break	0.2 (0.3)
3	Gentle breeze	7-10	Large wavelets; crests begin to break; foam of glassy appearance; perhaps scattered white horses	0.6 (1)
4	Moderate breeze	11-16	Small waves, becoming longer; fairly frequent white horses	1 (1.5)
5	Fresh breeze	17-21	Moderate waves, taking a more pronounced long form; many white horses are formed (chance of some spray)	2 (2.5)
6	Strong breeze	22-27	Large waves begin to form; the white foam crests are more extensive everywhere (probably some spray)	3 (4)
7	Near gale	28-33	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind	4 (5.5)
8	Gale	34-40	Moderately high waves of greater length; edges of crests begin to break into spindrift; foam is blown in well-marked streaks along the direction of the wind	5.5 (7.5)
9	Strong gale	41-47	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble and roll over; spray may affect visibility.	7 (10)

Beaufort Number	Descriptive Term	Mean wind speed equivalent in knots	Deep Sea Criterion	Probable mean wave height* in metres
10	Storm	48-55	Very high waves with long overhanging crests; the resulting foam, in great patches, is blown in dense white streaks along the direction of the wind; on the whole, the surface of the sea takes a white appearance; the tumbling of the sea becomes heavy and shock-like; visibility affected	9 (12.5)
11	Violent storm	56-63	Exceptionally high waves (small and medium-sized ships might be for a time lost to view behind the waves); the sea is completely covered with long white patches of foam lying along the direction of the wind; everywhere the edges of the wave crests are blown into froth; visibility affected	11.5 (16)
12	Hurricane	64 and over	The air is filled with foam and spray; sea completely white with driving spray; visibility very seriously affected	14 (-)

* This table is only intended as a guide to show roughly what may be expected in the open sea, remote from land. It should never be used in the reverse way, i.e., for logging or reporting the state of the sea. In enclosed waters, or when near land, with an off-shore wind, wave heights will be smaller and the waves steeper. Figures in brackets indicate the probable maximum height of waves.

Source: Observer Manual - Australian Fishing Zone. Australian Department of Primary Industry, Canberra, Australia.

A GLOSSARY OF JAPANESE FISHING TERMS

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The following glossary is not intended to be definitive or comprehensive, but has been designed as a practical tool to facilitate communication between fisheries workers and Japanese personnel.

English/Anglais	Japanese/Japonais	French/Français
Fish/Marine Life		Poissons/Faune et flore marines
Fish	- Sakana	Poisson
Skipjack (Katsuwonus pelamis)	- Katsuo	Bonite à ventre rayé
Yellowfin (Thunnus albacares)	- Kihada maguro	Thon jaune
Bigeye (Thunnus obesus)	- Mebachi maguro	Thon obèse
Small bigeye (T. obesus)	- Daruma	Petit thon obèse
Mackerel tuna (Euthynnus affinis)	- Yaito, Suma	Bonite à dos rayé
Bullet tuna (Auxis rochei)	- Marusodakatsuo	Auxide
Frigate tuna(Auxis thazard	- Hirasodakatsuo	Auxide
Northern bluefin (Thunnus thynnus)	- Kuromaguoro	Thon rouge
Southern bluefin (Thunnus maccoyii)	- Minami maguro	Thon rouge austral
Dogtooth tuna (Gymnosarda unicolor)	- Isomaguro	Thon à dents de chien
Longtail tuna(Thunnus tonggol)	- Koshinaga	Pas de nom en Français
Albacore(Thunnus alalunga)	- Tonbo, Bincho	Germon
Rainbow runner(Elegatis bipinnulatus)	- Okiburi, Tsumuburi	Coureur arc-en-ciel
Triggerfish(Fam. Balistidae)	- Kawahagi	Baliste (balistidés)
Common dolphinfish(Coryphaena hippurus)	- Shiira	Coryphène
Barracuda(Sphyraena spp.)	- Onikamasu	Bécune, barracuda (sphyrenidés)
Trevallies, jacks(Fam. Carangidae)	- Aji	Carangues (carangidés)
Shark(Order Lamniformes)	- Same	Requin(ordre des lamniformes)
Wahoo(Acanthocybium solandri)	- Sawara, Okisawara	Thazard du large
Swordfish(Xiphias gladius)	- Mekajiki	Espadon
Sailfish(Istiophorus platypterus)	- Bashokajiki	Voilier
Black marlin (Makaira indica)	- Shirokawa	Marlin noir
Blue marlin (Makaira nigricans)	- Kurokawa	Marlin bleu
Striped marlin (Tetrapturus audax)	- Makajiki	Marlin rayé
Shark mackerel, double - lined mackerel(Grammatorcinus bicarinatus)	- Nijosaba	Maquereau saumon
Whale	- Kujira	Baleine
Flying fish(Fam.Exocoetidae)	- Tobi Uo	Exocet (exocoetidés)
Turtle	- Kame	Tortue marine
Porpoise	- Iruka, Eoto kujira	Marsouin
Bait	- Esa	Appât, boëtte
Jellyfish	- Kurage	Méduse

Saury(Fam. Scomberesocidae)	- Sanma	Orphie (scombresocidés)
Sardine(Fam. Clupeidae)	- Iwashi	Sardine (clupéidés)
Herring(Fam. Clupeidae)	- Nisin	Hareng (clupéidés)
Seaweed	- Wakame	Algues
Seal	- Azarashi	Phoque
Crustacea	- Kokakurui	Crustacés

Types of Vessels		Types de bateaux
Pole-and-liner	- Ippon zurisen	Canneur
Longliner	- Haenawasen	Palangrier
Purse-seiner	- Makiamisen	Senneur
500 tonne seiner	- Kaigaimakiamisen	Senneur de 500 tonneaux
116 tonne seiner	- Kinkaimakiamisen	Senneur de 116 tonneaux
Net boat	- Amisen	Bateau à filets
Search boat	- Gyotansen	Bateau de recherche
Carrier boat	- Katsuosen no upansen	Bateau transporteur
Patrol vessel	- Patrolsen	Patrouilleur
Mothership	- Bosen	Bateau - mère
Scientific research ship	- Kagukuchosasen	Navire océanographique

Types of Schools	- Gyogun no shurui	Types de Mattes
School	- Gyogun, Tsumure	Matte
Log school	- Kizuki	Matte sous épave
Whale school	- Kujirazuki	Matte sous baleine
Rippler	- Mizumochi	Balbaya
Boiler	- Shirawaki	Brisant
Payao school	- Jinkoryuboku	Matte sous payao
Porpoise school	- Irukazuki	Matte sous marsouins

Parts of Purse-Seine Vessel		
Cabin	- Shitsu, Heya	Cabine
Bathroom	- Furoba	Salle de bains
Wheelhouse	- Senkyo, Burizi	Timonerie
Upper deck	- Jokohan	Pont supérieur
Galley	- Makanai shitsu	Cuisine
Mess/saloon	- Shokudo	Carré
Engine room	- Kikan shitsu	Chambre des machines
Forecastle	- Kohansoko	Gaillard
Fish hold	- Gyoso	Cale à poisson
Power block	- Ami sabaki, Pawaburokku	Palan mécanique
Purse winch	- Pasu uinchi	Treuil à senne
Main skiff	- Lekko boto, Ichigotei	Skiff principal, annexe
No.2 skiff	- Nigotei	Skiff No.2
No.3 skiff	- Sangotei	Skiff No.3
Speedboat	- Speedboto	Vedette, glisseur
Chart room	- Kaizu shitsu	Chambre de veille
Bow	- Omote, Senshu	Proue

Stern	- Tomo, Sembi	Poupe
Port	- Torikaji	Bâbord
Starboard	- Omokaji	Tribord
Hull	- Sentai	Coque
Radio Room	- Museinshitsu	Central radio
Propeller	- Propera	Hélice
Mast	- Masto	Mât
Deck	- Kohan	Pont
Tow rope	- Ote	Câble de remorquage

Parts of Net		Parties du filet
Net	- Ami	Filet
Floats	- Aba	Flotteurs
Rings	- Kan	Anneaux
Wire ring line	- Kosaku, Wire rope	Ralingue
Mesh	- Amime	Maillage
Net needle	- Abari	Aiguille à filet, navette
Net twine	- Ito	Fil à filet
Netting	- Amichi	Filet
Sinkers, leads	- Omori	Plombs et lests

Mechanics of Setting		Opérations de pose des filets
Standby	- Junbi, Stanbai	Paré
Set	- Tomo	Pose (coup de senne)
Let go	- Lekko	Largage
Rings up	- Kanmaki shuryo	Fermeture du filet
Stacking	- Yomo	Rangement du filet
Drying up	- Ami okoshi	Virement
Brailing	- Sakana no torikomi	Salabardage
Net roll up	- Bomaki	Filet emmêlé
Net mending	- Ami shuri	Remaillage, ramendage, du Filet.

Gear		Accessoires
Gaff	- Kagi	Gaffe
Hook	- Tsuribari	Hameçon
Rope	- Tsuna	Filin
Binoculars	- Sogankyo	Jumelles
Brailing scoop	- Tamo	Puisette à décharger
Boots	- Nagagutsu	Bottes
Hard hat	- Herumeto	Casque
Gloves	- Tebukuro	Gants
Oar	- Kai	Aviron
Bamboo	- Take	Bambou
Anchor	- Ikari	Ancre
Payao	- Payao	Payao
Small line	- Himo	Petite ligne

Oceanography		Océanographie
Current	- Choryu	Courant
Seamount	- Yanjin	Haut-fond
Current meter	- Choryukei	Courantomètre
Sea surface temperature	- Kaisuion, Kaisui no ondo	Température de la mer en surface
Salinity	- Enbun	Salinité
Border between currents	- Shiome	Frontière entre courants
Crew	- **Senin**	**Equipage**
Vessel Owner	- Senshu	Armateur
Captain	- Sencho	Capitaine
Fishing Master	- Gyorocho	Patron de pêche
Chief Engineer	- Kikancho	Chef mécanicien
Bosun	- Bosun	Maître d'équipage
Crew list	- Senin meibo	Role d'équipage
Navigation	- **Kokai**	**Navigation**
Degree	- Do	Degré
Minute	- Fun	Minute
Second	- Byo	Seconde
GMT	- GMT	GMT
Speed	- Husoku, Sokuryoku	Vitesse horaire
Fishing port	- Gyoko	Port de pêche
Island	- Shoto, Shima	Île
Archipelago	- Gunto	Archipel
Lighthouse	- Todai	Phare
Wharf	- Futo	Wharf, quai
Territorial sea	- Ryokai	Mer territoriale
Reef	- Ansho	Récif
Course	- Shinro, Cosu	Route
Direction	- Hoko	Direction
Noon position	- Shogo ichi	Position à midi
Chart	- Kaizu	Carte
Latitude	- Ido	Latitude
Longitude	- Keido	Longitude
Radar	- Radar	Radar
Satellite navigation	- Eisei koho	Navigation satellite
Set position	- Tomo ichi	Position de pêche
Current	- Choryu	Courant
Sonar	- Sonar	Sonar
Offshore	- Okiai	Au large
Steaming	- Kokai	En route
Drifting	- Nagashi	Dérivant
Calm	- Nagi	Bonace, mer calme
Rough	- Arai	Mer houleuse, grosse
Storm	- Arashi	Tempête
Fishing ground	- Gyojo	Lieu de pêche, pêcherie

Scientific Terms		Termes Scientifiques
Species	- Shurui	Espèce
Male	- Os	Mâle
Female	- Mes	Femelle
Length	- Nagasa	Longueur
Weight	- Omosa	Poids
Gonads	- Seishokusen	Gonades
Stomach	- I	Estomac
Fin	- Hirei	Nageoire, aileron
Fish scale	- Uroko	Écailles
Gill	- Era	Ouïes, Branchies
Weighing scales	- Hakari	Balance
Measuring board	- Monoshashi	Planche graduée
Stomach contents	- I no naiyobutsu	Contenu stomacal
To measure lengths	- Nagasa o hakaru	Mesurer la longueur
To weigh	- Omosa o hakaru	Peser
Biologist	- Kagakusha	Biologiste
Fish tag	- Hyoshiki	Marque à poisson
Tagged fish	- Hyoshiki-gyo	Poisson marqué
Otolith	- Jiseki	Otolithe
To estimate	- Mitsumoru	Estimer
Specimen	- Hyohon	Specimen, échantillon

Other		Divers
Full moon	- Mangetsu	Pleine lune
New moon	- Shingetsu	Nouvelle lune
Too much current for set	- Ami o ireru niwa ahio ga hayai	Courant trop fort pour larguer le filet
Too rough for set	- Ami o ireru niwa nami ga arasugiru	Mer trop grosse pour larguer le filet
Fisheries co-operative	- Gyogyo Kiyodokumia	Coopérative de pêcheurs
Fresh fish	- Seigyo	Poisson frais
Dried fish	- Kangyo	Poisson séché
Canned fish	- Kakogyo utsu	Poisson en conserve
Fishing catch	- Gyokakubutsu	Prise de poisson
Purse seine fishery	- Makiami gyogyo	Pêche à la senne tournante
Longline fishery	- Haenawa gyogyo	Pêche à la plangre
Fishing permit	- Gyogyo kyokasho	Permis de pêche
Call sign	- Call sain	Indicatif
Base	- Kichi	Base
Vessel name	- Senmei	Nom du bateau
Incidental catch	- Konkaku	Prises fortuites.