SCTB13 Working Paper

BBRG–15

A preliminary summary of (i) species identification problems, (ii) discarding practices and (iii) the life status of billfish taken in longline fisheries of the western and central Pacific Ocean, according to information collected by observers and logbook data

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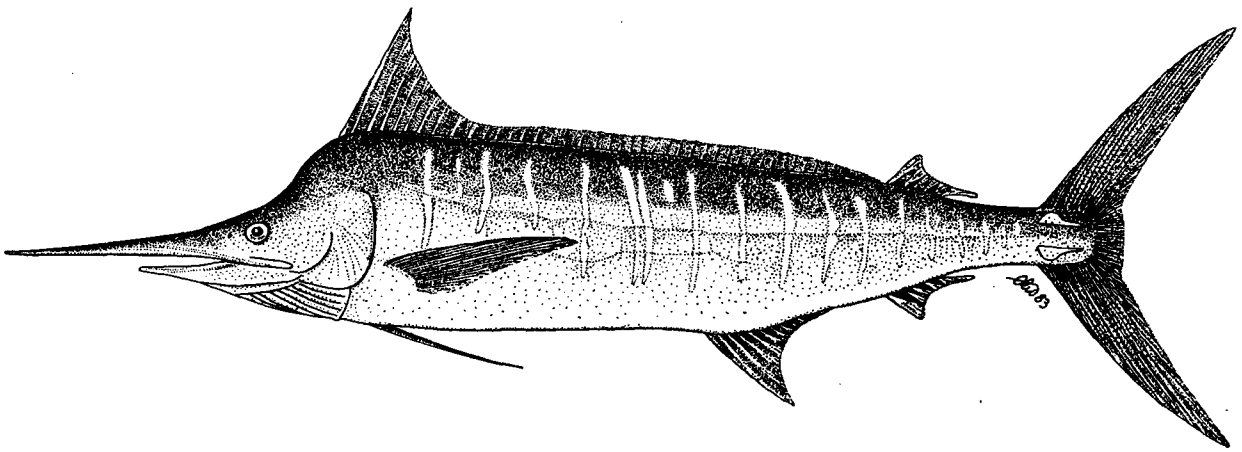

Oceanic Fisheries Programme
Secretariat of the Pacific Community
Noumea, New Caledonia

July 2000

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1. INTRODUCTION

Billfish, as a group, form the most distinctive part of the by-catch of longline vessels in the western and central Pacific Ocean (WCPO), and, in some cases, may be secondary or even primary target species. The four main billfish species taken by longline vessels in the WCPO are blue marlin (*Makaira mazara*), black marlin (*M. indica*), striped marlin (*Tetrapturus audax*) and swordfish (*Xiphias gladius*). Two additional billfish species (shortbill spearfish, *Tetrapturus angustirostris* & sailfish, *Istiophorus platypterus*) occur in the WCPO, but less is known about the extent of catch for these species due mainly to problems in logsheet reporting and species misidentification (Farman, 1988; Bailey et al., 1996).

The Billfish and Bycatch Research Group (BBRG) reviewed various information presented on billfish during the *Twelfth Meeting of the Standing Committee on Tuna and Billfish* (SCTB12), held in Papeete, Tahiti 16–23 June 1999. The group considered what steps would be necessary to improve knowledge of billfish in important areas where knowledge is currently lacking. As a result of these deliberations, certain participants were directed to compile information on the following, and report the findings to SCTB13.

> " *...[i] check current and historical species identification, particularly for black marlin–blue marlin and sailfish–spearfish ...*
> *... [ii] For longline fisheries, estimate current and historical levels of discarding for each billfish species ...*
> *... [iii] Report on the life status of billfish caught by longline ...* ".

The purpose of this paper is to therefore present findings related to these assignments based on information compiled from SPC data holdings.

2. BILLFISH SPECIES IDENTIFICATION PROBLEMS

2.1 Introduction

There have been several accounts of misidentification in longline catch reporting of billfish in the WCPO fisheries (Farman, 1986; Bailey et al., 1996). Instances of billfish species misidentification generally fall into three basic categories: (i) obvious cases where a particular billfish species has been reported in waters where it clearly should not be as prevalent as was reported; (ii) observers reporting obvious cases where the vessel has misidentified a billfish species in logbook reporting; and (iii) difficulty in determining species at landing when specimens have been processed.

The following describes instances of billfish misidentification that have come to our attention in the past. Some of these problems have been resolved through standardisation and translation of logbooks or observer intervention. Other problems are currently being addressed.

2.2 Specific problems with billfish species identification

The following list describes current and historic problems with billfish species identification.

1. Bailey et al. (1996) describe a problem in WCPO longline fisheries that was resolved more than a decade ago - " ... confusion may also stem from Japanese names of marlin species, for example, black marlin (*shirokajiki*) is referred to in japanese as 'white' marlin and blue marlin (*kurokajiki*) as 'black' marlin. ...".

2. Observers active on Tongan longline vessels suggest that the mis-reporting of marlin species on logsheets stems from the fact that there isn't a word in the Tongan language for each of the marlin species. Hence, all marlin catch are apparently grouped and recorded in the first billfish species column of the logsheet.

3. Farman (1988) reports that there are often problems with the identification of sailfish verus short-billed spearfish. Amongst new observers and port samplers, this has been a minor problem, resolved once the first sailfish was encountered. It is possible that some short-billed spearfish were mis-identified as sailfish but doubtful that there were many "mis-identifications" in the opposite sense. In recent years, training has emphasised avoiding this problem. The same problem may occur amongst new crew but it is very doubtful that experienced fisherman could make such a mistake, unless the error is again from mis-interpretation of the meaning of words used to name the fish in different languages. Sailfish and short-billed spearfish tend not to be reported on logbooks (exceptions include the Japanese distant-water and New Caledonian fleets), suggesting that these species are the least important of the billfish taken by longline vessels.

4. A more common problem is the mis-identification of processed (headed and gutted) catch at port sampling, but in this case it is more likely to be confusion between shortbill spearfish and Wahoo.

5. Some fleets remove the heads, fins and tails of billfish after landing and before storing in their holds. When marlin are unloaded at port, the trunk, and the loss of colour in the epidermis make it very difficult to identify the species. In most cases the dorsal fin will still remain and this is a useful identifying characteristic to back up the port samplers initial impressions from colour, surface texture and shape of marlin. However, port sampling data is an important means of verifying logbook catch reported by a vessel and it may therefore be useful to have some method of correctly identifying the trunks of billfish unloaded at the end of a trip. In this respect, the CSIRO has developed a billfish identification guide, and identification using electrophoresis techniques have also been investigated. SPC are in the process of finalising a species guide that will include billfish, and are considering development of high-quality posters in several languages.

6. Curran et al. (1996) indicates that there are problems with species misidentification (to an unknown degree) amongst the billfish reported on logbooks in the Hawaiian longline fishery.

7. In the Australian longline fishery, regulations requiring mandatory release of marlin mean crew often have difficulties identifying the species that are not landed (Ward, pers. comm.).

8. Taiwanese offshore longline vessels operating in Micronesian waters under management of Polar International, a fishing company based in Guam, are using a logsheet form, based on the regional standard, that apparently has the Mandarin translation of blue marlin and black marlin reversed. As such, this fleet regularly reports catch of black marlin when it should clearly be blue marlin, based on the observer-reported species composition for this fleet and the catches of

other fleets operating in this area. Efforts have been made to correct this mistake with the logsheet form.

Three activities that will help resolve misidentification problems in the future are:

(i) the (further) education of vessel crew on billfish species identification (e.g. the production and extensive distribution of a high quality posters in several languages);
(ii) a means to clearly identify the trunks of billfish species at unloading (e.g. the production and extensive distribution of a high quality poster in several languages), and
(iii) improved training of port samplers and observers to not only better identify species but also to pass on this information to vessel captains and crews. This is being addressed within the OFP who are increasing their fisheries monitoring staff three-fold in the coming year.

3. DISCARDING OF BILLFISH

3.1 Introduction

Bailey et al. (1996) noted discards are '*...an irregular and unpredictable feature of the fishery ...*'. Discards are considered not only to vary amongst fleets but also amongst vessels in the same fleet. In fact, one vessel may have different discarding practices from one trip to another. For example, freezer space on one trip may limit the retention of certain bycatch species that are usually retained. Due to this unpredictability, use of discard rates in estimation of catches is considered problematic.

The discards of billfish are rarely reported in logbooks, and the only accurate indication of the extent of discarding practices is currently via observer reporting. Observers are asked to record the 'fate' of the catch as retained (whole or partial) or discarded (whole or partial), in addition to further detail including the specific processing undertaken and why each fish is retained or discarded.

The following is an attempt to describe the extent of billfish discarding practices in the WCPO longline fisheries in areas where observer data have been collected; this is primarily the equatorial band of the WCPO. Note that the observer data from the Australian longline fishery has not been included in this review even though it is held by the OFP.

3.2 Extent of billfish discarding practises

APPENDIX 1 shows the frequency of discarding in observer trips for each billfish species, according to observer reports. APPENDIX 2 provides a summary of discards, categorised by the reason for discard, for each fleet. (Note that % discard for all fleets presented in Appendix 2 does not represent the estimated total discard rates in the fishery as no attempt has been made to raise fleet discard rates to account for total estimated effort for each fleet). Table 1 shows the proportion of catch discarded by fleet.

Table 1. Proportion of catch discarded (%) by longline fleet

Vessel nation	trips	BLUE MARLIN N	BLUE MARLIN %	BLACK MARLIN N	BLACK MARLIN %	STRIPED MARLIN N	STRIPED MARLIN %	SWORDFISH N	SWORDFISH %	SAILFISH N	SAILFISH %	SPEARFISH N	SPEARFISH %	YELLOWFIN N	YELLOWFIN %	BIGEYE N	BIGEYE %
China	68	222	11	73	15	53	19	322	42	52	27	113	13	1,941	11	1,405	3
Fiji	9	43	5	20	10	15	0	27	7	44	5	173	8	652	10	350	12
FSM	17	25	4	24	13	6	0	31	32	8	25	5	20	633	8	341	3
Japan	33	281	12	86	15	169	8	193	46	127	72	146	26	6,063	16	4,438	5
Korea	5	138	3	133	6	99	8	28	43	18	33	53	30	1,650	3	962	3
New Caledonia	16	38	11	5	0	188	1	26	0	31	6	60	10	804	8	192	1
French Polynesia	8	54	2	2	0	53	6	25	44	2	50	14	7	170	6	457	6
PNG	13	78	10	11	0	59	3	268	14	106	28	44	0	960	8	139	4
Tonga	9	21	10	26	0	64	2	29	7	18	0	69	3	902	4	253	2
Taiwan	69	1,026	5	182	7	189	3	879	31	647	32	339	53	6,502	8	4,036	5
USA	5	9	0	47	6	7	0	52	10	9	11	2	0	277	7	251	4
		1,935	7	609	9	902	5	1,880	30	1,062	34	1,018	27	20,554	10	12,824	5

'N' represents total catch by number of this species in this fleet
'%' represents percentage of this catch that is discarded
Note that % discard for all fleets presented here does not represent the estimated total discard rates in the fishery as no attempt has been made to raise fleet discard rates to account for total estimated effort for each fleet.

3.2.1 Discards of billfish

The following observations relate to the information presented herein.

- From Appendix 1 we note that for each species, the distribution of discarding practice amongst vessels (%) is variable; fleet behaviour appears to result in mostly zero-discard trips;
- When a species is commercially viable the main reason for discarding is shark damage;
- High discard rates of sailfish and spearfish in most fleets because they are not very highly rated;
- There is higher than expected swordfish discard rates, considering its high value, due to most observer activity being in the equatorial waters where small swordfish are prevalent;
- On small vessels some very large marlins are difficult to land and are sometimes struck off a line;
- As for target tuna, the main reason for discard of most billfish is shark or whale damage.

3.2.2 Billfish discards for selected foreign fleets

The following sections describe the discard practices of selected foreign fleets operating in SPC member countries according to observers. Appendix 2 provides a summary of discards, categorised by the reason for discard, for each fleet. (Note that % discard for all fleets presented in Appendix 2 does not represent the estimated total discard rates in the fishery as no attempt has been made to raise fleet discard rates to account for total estimated effort for each fleet).

China

This fleet fishes almost exclusively in the equatorial waters of SPC member countries (e.g. FSM, Marshall Islands and Palau). Discarding of billfish appears to be dependent on several factors. In some countries, as a foreign-registered fleet, Chinese vessels have been issued with a license to only land tuna. The rational behind this requirement is to prevent sale into the local market of the lesser-

valued fish for which the cost of airfreight prevents export, thus protecting the local fishing industry.

In previous years, the Chinese fleet unloaded and stored billfish catch in cold storage at unloading ports in the region (e.g. Palau, FSM and Marshall Is.). These accumulated over several weeks until large reefer vessels took them back to China. In more recent years the practice on many vessels of using special lines to target shark (for their fins) has led to instances of this marlin being used as bait. Although an observer will record such marlin as retained (ROR – "retained other reason") the vessel itself may be inclined to acknowledge them as discards, which it generally will not record. Certain gamefish interests have recently been applying increasing pressure for the establishment of legislation to release the marlins that are still alive on landing.

Japan

The Japanese fleet is made up of two different types of vessel - smaller offshore vessels that target fresh fish sashimi tuna and large high seas ultra low-temperature freezer vessels. Space is a limiting factor on the smaller vessels so lower value billfish may be struck off if the vessel is running out of space. This fleet can also be limited by its foreign license to only export fish so that billfish are only landed to export if there is space left on out-going planes.

High seas freezer vessels with their greater holding and preservation capacity are more likely to retain all billfish for sale.

Korea

During one 82-day SPC observer trip aboard a Korean distant water longliner fishing tropical waters nearly all billfish except swordfish were retained. Sixty-seven per cent of swordfish were discarded because of their small size. This seems typical of a high-seas vessel but some personal communication with Pacific Island crew employed on such vessels indicates that they may, at times, only retain bigeye and yellowfin tuna.

Taiwan

The Taiwanese fleet is again made up of two types of vessels; the smaller fresh fish sashimi grade vessels and larger freezer vessel. Again, the different nature of each vessel type's capacities and markets influences billfish discarding practices.

3.2.3 Billfish discards by domestic foreign fleets

The following sections describe discard practices of selected domestic fleets operating in SPC member countries according to observers. Appendix 2 provides a summary of discards by discard category (reason for discard) for each fleet. (Note that % discard for all fleets presented in Appendix 2 does not represent the estimated total discard rates in the fishery as no attempt has been made to raise fleet discard rates to account for total estimated effort for each fleet).

Fiji

The Fiji domestic fleet lands almost all by-catch, including billfish. This goes mostly into the domestic market but some is also exported. Nearly all reported discards are due to shark damage.

FSM

Most billfish are retained for sale in local markets and most discards are explained by shark damage.

New Caledonia

The domestic fleet sells nearly all non-export fish locally. However, the seasonal nature of billfish catches, with increased striped marlin landings from November to January, leads to a glut. Storage facilities can become limiting, when the fleet may be encouraged to avoid and discard marlin.

French Polynesia

The French Polynesia fleet has two vessel-types - smaller boats that do short trips targetting fresh sashimi-grade fish and larger freezer vessels that loin and deep-freezes catch. Both vessel types land non-export fish to local markets. Sashimi vessels tend to discard shark damaged fish while the freezer vessel, as they loin most catch, cut out shark damaged portions of a fish and retain the rest.

Papua New Guinea

All observer data from PNG has been taken from fresh-fish sashimi vessels that sell most of their billfish to local markets. The main reason for discarding marlin is shark damage. A large number of small swordfish were noted as discarded during one observer trip.

Recently, a large portion of the PNG longline fleet has primarily targetted sharks, although this is carried out under the umbrella of tuna fishing licenses in the absence of a shark management plan. It is likely that this practice may impact on the discard practices of these vessels. Recent SPC and PNG national observer efforts are addressing this issue.

Tonga

This fleet targets sashimi grade fresh-fish and lands most by-catch into the local market. Billfish discards are expected to be low except for shark damaged fish. One observer trip reported high discarding of blue marlin due to whale damage, which is unusual.

4. LIFE STATUS OF BILLFISH

4.1 Introduction

The life status, or condition, of the individual catch from longline vessels at landing has been one of several attributes of the catch recorded by observers. This is sometimes viewed as a subjective measure and care has been taken in assigning categories that attempt to reduce the bias in observer reporting. The OFP observer programme requires observers to record the life status of individual catch from longline vessels with one of the following categories:

A0	Alive (no further information provided)
A1	Alive healthy
A2	Alive - injured or distressed (with good chance of surviving)
A3	Alive but dying
D	Dead
U	Condition unknown

Despite this effort observers report that it can be difficult to decide between categories A2 and A3. A2 is quite subjective still. This issue is being addressed in part through better training.

A recent review of the observer data collection forms identified a problem in the life status reporting. It was evident that the condition of the catch at time of landing was often different to that when the catch was release/discarded, and that the data collection forms were not catering for this. As such, observers have in recent years been advised to collect both condition of catch at landing and condition of the catch at time of release/discard. The collection of this type of information will ultimately contribute to knowledge on the survival of released/discarded billfish.

4.2 Life status summaries

Table 2. shows the survival rates of billfish according to observer data collection (note that this does not include the data provided by AFMA for observers active in the AFZ). The following observations relate to the information presented in this table and available from observer reports.

- The available data suggest that striped marlin appear to be most resilient (64% alive at time of landing) of the billfish;
- Swordfish appear to be one of the least resilient species according to the data presented herein. This is probably due to the observer data collection mostly occurring in equatorial areas where small swordfish are more prevalent. In more temperate areas, the average size of the swordfish is much larger and in these areas it is one of the more resilient species (Bailey et al., 1996).
- Future work should therefore look at size and spatial variability in regards to the life status for each of these species;
- Sailfish and short-billed spearfish appear to be the least resilient of the billfish species.

Table 2. Condition of billfish species at landing

Species	No. of fish observed	% Alive at landing	ALIVE - CATEGORIES: Alive (no category provided)	Alive, healthy	Alive - Injured or distressed	Barely Alive	Dead
BLACK MARLIN	625	*51*	*9*	*19*	*9*	*15*	*49*
BLUE MARLIN	1,985	*54*	*15*	*24*	*7*	*8*	*46*
STRIPED MARLIN	859	*64*	*12*	*25*	*12*	*15*	*36*
SAILFISH	1,108	*32*	*8*	*11*	*6*	*7*	*68*
SHORT-BILLED SPEARFISH	1,006	*36*	*6*	*13*	*6*	*10*	*64*
SWORDFISH	1,774	*34*	*12*	*8*	*5*	*9*	*66*

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Williams, P. G., K.A. Bigelow & A.W. Whitelaw. (1999). Estimates of longline billfish catch (1980–1997) in the western and central Pacific Ocean. Working Paper BBRG–2. *Twelfth Meeting of the Standing Committee on Tuna and Billfish (SCTB12)*. 16–23 June 1999. Papeete, Tahiti.

APPENDIX 1. OBSERVER-REPORTED DISCARDS IN THE LONGLINE FISHERY

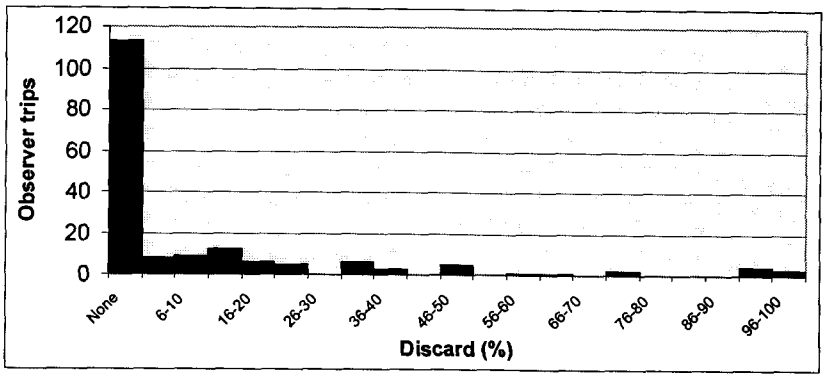

Figure A1.1 Frequency of observer-reported discard % of BLUE MARLIN

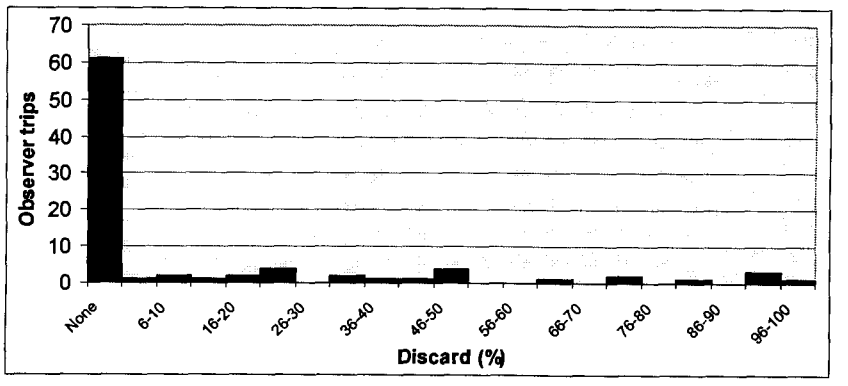

Figure A1.2 Frequency of observer-reported discard % of BLACK MARLIN

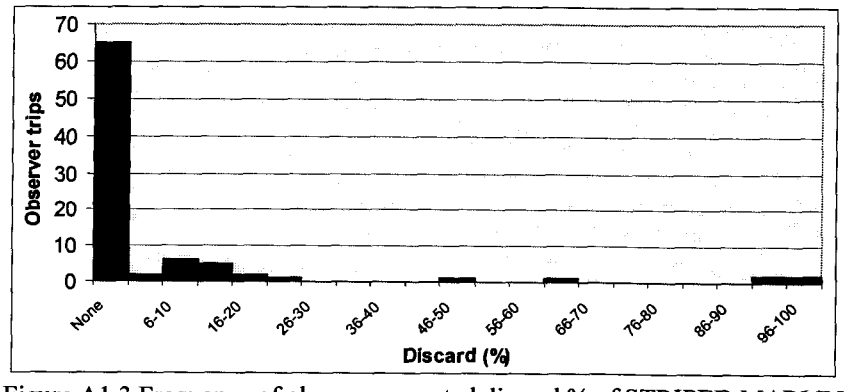

Figure A1.3 Frequency of observer-reported discard % of STRIPED MARLIN

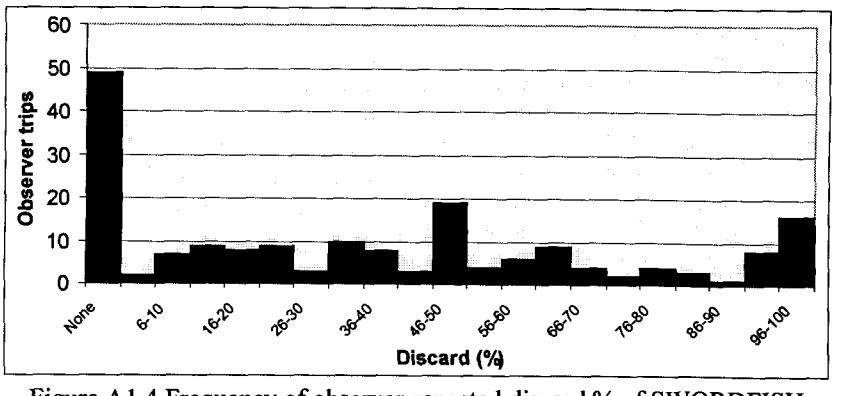

Figure A1.4 Frequency of observer-reported discard % of SWORDFISH

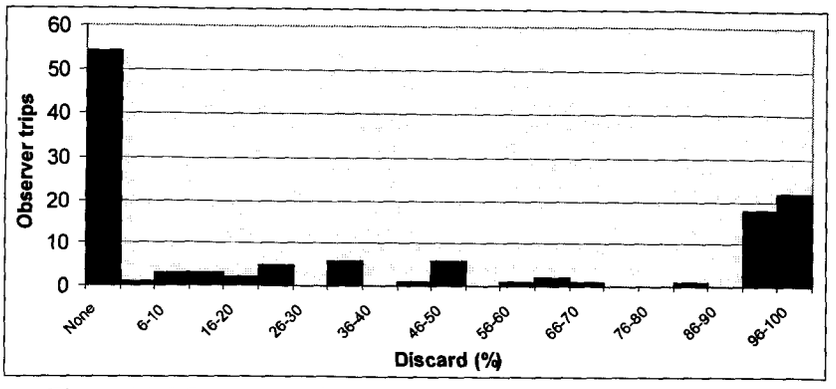

Figure A1.5 Frequency of observer-reported discard % of SAILFISH

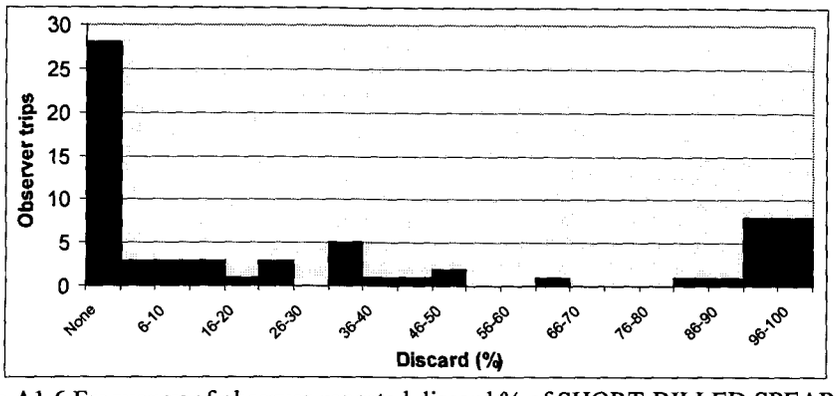

Figure A1.6 Frequency of observer-reported discard % of SHORT-BILLED SPEARFISH

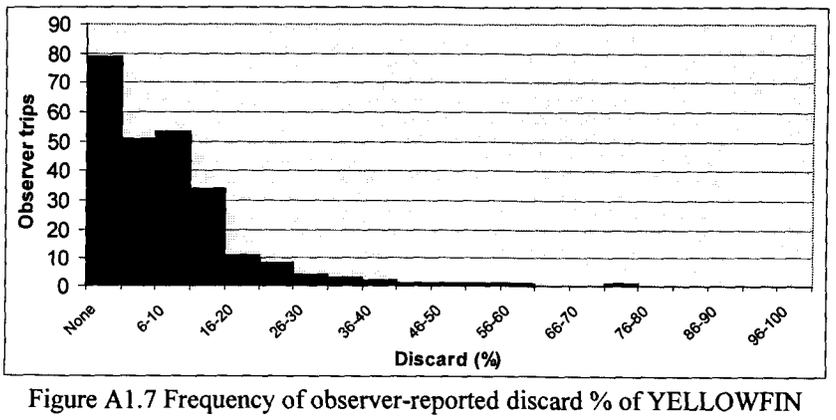

Figure A1.7 Frequency of observer-reported discard % of YELLOWFIN

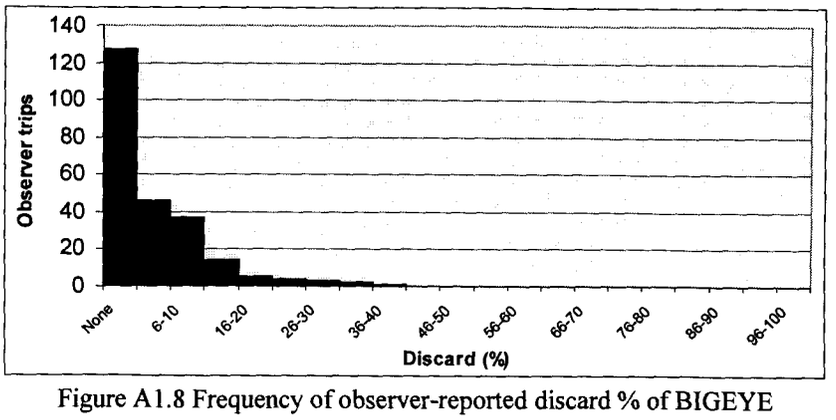

Figure A1.8 Frequency of observer-reported discard % of BIGEYE

APPENDIX 2. PROPORTION OF CATCH DISCARDED BY FLEET AND REASON FOR DISCARD

(Note that % discard for all fleets presented here does not represent the estimated total discard rates in the fishery as no attempt has been made to raise fleet discard rates to account for total estimated effort for each fleet).

Table A2.1 Percentage (%) of BLUE MARLIN discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	222	11.3	1.4	2.3	1.4	0.9	2.3	0.9	2.3
Fiji	43	4.7	0.0	0.0	0.0	0.0	4.7	0.0	0.0
FSM	25	4.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
Japan	281	12.5	4.3	3.2	0.0	0.7	2.8	0.7	0.7
Korea	138	2.9	0.0	0.7	0.0	0.0	1.4	0.7	0.0
New Caledonia	38	10.5	0.0	0.0	0.0	0.0	7.9	0.0	2.6
French Polynesia	54	1.9	0.0	0.0	0.0	0.0	1.9	0.0	0.0
PNG	71	11.3	0.0	0.0	0.0	0.0	9.9	0.0	1.4
Tonga	21	9.5	0.0	0.0	0.0	0.0	4.8	4.8	0.0
Taiwan	1,026	5.3	1.1	0.1	0.7	0.1	2.4	0.3	0.6
USA	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1,928	7.1	1.3	0.8	0.5	0.3	2.8	0.5	0.8

Table A2.2 Percentage (%) of BLACK MARLIN discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	73	15.1	0.0	4.1	1.4	8.2	0.0	0.0	1.4
Fiji	20	10.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0
FSM	24	12.5	4.2	4.2	4.2	0.0	0.0	0.0	0.0
Japan	86	15.1	4.7	3.5	3.5	2.3	1.2	0.0	0.0
Korea	133	6.0	0.0	0.8	0.0	0.0	3.8	1.5	0.0
New Caledonia	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
French Polynesia	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PNG	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tonga	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taiwan	182	6.6	0.0	0.0	3.3	0.0	2.2	0.5	0.5
USA	47	6.4	2.1	2.1	2.1	0.0	0.0	0.0	0.0
	607	8.6	1.0	1.5	2.0	1.3	2.0	0.5	0.3

Table A2.3 Percentage (%) of STRIPED MARLIN discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	53	18.9	7.5	5.7	0.0	1.9	0.0	0.0	3.8
Fiji	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FSM	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	169	7.7	1.2	2.4	0.0	0.0	4.1	0.0	0.0
Korea	99	8.1	0.0	1.0	0.0	1.0	5.1	1.0	0.0
New Caledonia	188	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0
French Polynesia	53	5.7	0.0	0.0	0.0	0.0	5.7	0.0	0.0
PNG	32	6.3	0.0	0.0	0.0	0.0	6.3	0.0	0.0
Tonga	64	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0
Taiwan	189	3.2	0.0	0.0	0.5	0.0	2.1	0.5	0.0
USA	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	875	5.0	0.7	0.9	0.1	0.3	2.5	0.2	0.2

Table A2.4 Percentage (%) of SWORDFISH discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	322	41.6	19.3	9.9	2.8	5.0	2.2	0.9	1.6
Fiji	27	7.4	3.7	0.0	0.0	0.0	0.0	0.0	3.7
FSM	31	32.3	12.9	3.2	3.2	3.2	6.5	0.0	3.2
Japan	193	45.6	22.8	12.4	5.2	2.1	2.1	0.5	0.5
Korea	28	42.9	3.6	35.7	0.0	3.6	0.0	0.0	0.0
New Caledonia	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
French Polynesia	25	44.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0
PNG	156	23.1	13.5	0.0	0.0	1.9	7.1	0.0	0.6
Tonga	29	6.9	3.4	0.0	0.0	0.0	0.0	3.4	0.0
Taiwan	879	30.6	20.8	1.4	2.5	0.8	3.6	0.2	1.3
USA	52	9.6	0.0	1.9	0.0	1.9	1.9	0.0	3.8
	1,768	**32.2**	**18.6**	**4.5**	**2.4**	**1.9**	**3.2**	**0.4**	**1.2**

Table A2.5 Percentage (%) of SAILFISH discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	52	26.9	0.0	13.5	7.7	1.9	1.9	0.0	1.9
Fiji	44	4.5	0.0	0.0	0.0	0.0	4.5	0.0	0.0
FSM	8	25.0	0.0	12.5	12.5	0.0	0.0	0.0	0.0
Japan	127	72.4	0.8	45.7	18.1	5.5	2.4	0.0	0.0
Korea	18	33.3	11.1	0.0	11.1	5.6	0.0	0.0	5.6
New Caledonia	31	6.5	0.0	0.0	0.0	0.0	6.5	0.0	0.0
French Polynesia	2	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
PNG	106	28.3	0.0	11.3	0.0	2.8	9.4	0.0	4.7
Tonga	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taiwan	647	32.1	1.2	18.1	7.4	2.5	1.9	0.0	1.1
USA	9	11.1	0.0	0.0	0.0	0.0	11.1	0.0	0.0
	1,062	**33.7**	**1.1**	**18.4**	**7.3**	**2.6**	**2.9**	**0.0**	**1.3**

Table A2.6 Percentage (%) of SHORT-BILLED SPEARFISH discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	113	13.3	0.0	2.7	0.0	0.0	5.3	0.0	5.3
Fiji	173	7.5	0.0	0.0	0.6	0.0	5.2	0.6	1.2
FSM	5	20.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
Japan	146	26.0	0.0	15.8	6.2	1.4	2.7	0.0	0.0
Korea	53	30.2	0.0	7.5	11.3	0.0	9.4	0.0	1.9
New Caledonia	60	10.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0
French Polynesia	14	7.1	0.0	0.0	0.0	0.0	7.1	0.0	0.0
PNG	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tonga	69	2.9	0.0	0.0	0.0	0.0	1.4	1.4	0.0
Taiwan	339	53.1	1.5	43.4	4.1	0.0	2.9	0.3	0.9
USA	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	985	**27.6**	**0.5**	**18.0**	**3.0**	**0.2**	**4.3**	**0.3**	**1.3**

Table A2.7 Percentage (%) of YELLOWFIN discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	1,941	11.1	4.9	0.1	0.1	0.2	4.5	0.7	0.6
Fiji	652	10.1	6.0	0.0	0.0	1.8	1.8	0.0	0.5
FSM	633	8.4	2.4	0.0	0.3	3.2	1.4	0.5	0.6
Japan	6,063	16.3	8.7	0.6	0.3	0.1	3.8	2.6	0.2
Korea	1,650	3.3	0.8	0.0	0.0	0.2	1.5	0.6	0.1
New Caledonia	804	8.1	0.6	0.0	0.4	0.0	6.5	0.5	0.1
French Polynesia	170	5.9	2.9	0.0	0.0	0.0	2.9	0.0	0.0
PNG	745	10.1	0.1	0.0	0.1	0.0	2.0	1.2	6.6
Tonga	902	3.8	0.0	0.1	0.1	0.0	3.4	0.1	0.0
Taiwan	6,502	8.2	3.4	0.2	0.2	0.2	3.3	0.7	0.2
USA	277	7.2	3.6	0.0	0.4	0.0	2.5	0.4	0.4
	20,339	**10.4**	**4.6**	**0.2**	**0.2**	**0.3**	**3.4**	**1.2**	**0.5**

Table A2.8 Percentage (%) of BIGEYE discarded by fleet and reason for discard

			REASONS FOR DISCARD (% of total catch)						
Vessel Nation	Number of fish caught	% discarded	Too small	Undes-irable	Struck off the line	Poor quality	Shark damage	Whale Damage	Other reasons
China	1,405	3.4	0.4	0.0	0.1	0.0	1.8	0.7	0.4
Fiji	350	11.7	8.9	0.0	0.0	0.0	2.6	0.0	0.3
FSM	341	3.2	1.8	0.0	0.0	0.0	1.2	0.3	0.0
Japan	4,438	4.9	1.9	0.3	0.0	0.1	0.6	1.8	0.1
Korea	962	2.6	0.5	0.0	0.3	0.0	1.4	0.4	0.0
New Caledonia	192	1.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0
French Polynesia	457	6.1	5.7	0.0	0.0	0.0	0.4	0.0	0.0
PNG	51	5.9	0.0	0.0	0.0	0.0	2.0	0.0	3.9
Tonga	253	2.4	0.4	0.4	0.0	0.0	0.8	0.8	0.0
Taiwan	4,036	5.2	2.0	0.1	0.1	0.1	1.5	1.2	0.0
USA	251	4.0	0.8	0.0	0.0	0.0	1.6	0.8	0.8
	12,736	**4.7**	**1.9**	**0.1**	**0.1**	**0.1**	**1.2**	**1.2**	**0.1**