INTERIM REPORT
OF THE ACTIVITIES OF THE SKIPJACK SURVEY AND ASSESSMENT PROGRAMME IN THE WATERS OF THE NEW HEBRIDES
(5-13 December 1977 and 20-23 January 1978)

R.E. Kearney
A.D. Lewis
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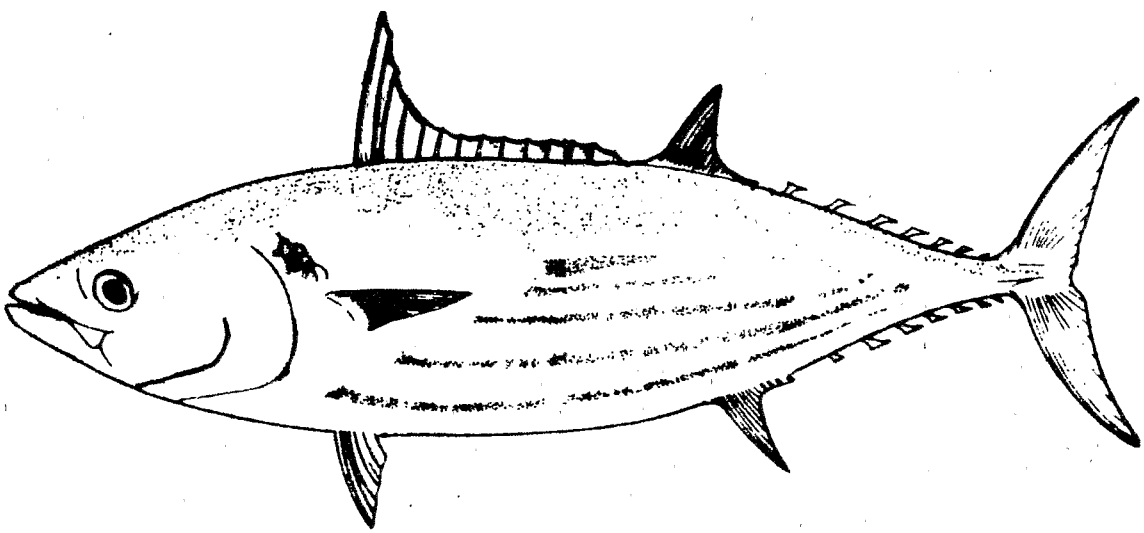

Skipjack Survey and Assessment Programme
Preliminary Country Report No.4

South Pacific Commission
Noumea, New Caledonia
May 1978

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1. INTRODUCTION

The New Hebrides differs from the two countries visited previously (Papua New Guinea and the Solomon Islands) in that no commercial skipjack fishery exists in this country to provide background data for the Programme; the South Pacific Fishing Company established at Palekula does provide a depot for long-line vessels but no pole and line vessels are based there. It was therefore anticipated that work done by the Programme in this area would be largely of a survey nature.

Several earlier surveys (JAMARC 1972, 1973) had met with little success because of difficulties in obtaining sufficient quantitites of bait using night baiting techniques, and it was hoped that during this survey other baiting techniques could be tried if night baiting once again proved unsuccessful. This visit however coincided with a period of great political activity within the country and Programme staff decided that day baiting, most of which would have taken place in traditional fishing areas, would have been unwise under the circumstances.

When the first ten days gave poor baiting results, the visit was temporarily suspended and left two future courses of action open:

(a) to return after completing the New Caledonia sector and hope that baiting conditions had improved and that other techniques might be tried;

(b) to transport live bait from New Caledonia and supplement it with bait obtained locally.

After a very successful month in New Caledonia, it was decided to take up the second option.

The survey of the New Hebrides was therefore carried out in two parts, the first from 5 - 13 December 1977 and the second from 20 - 23 January 1978.

2. VESSEL AND CREW

No major changes were made to the vessel and crew as described in the Solomon Islands report (Kearney and Lewis 1978).

Nine Japanese and nine Fijian crew, as well as the South Pacific Commission scientists, were on board the vessel for the duration of the cruise, but no observer from the New Hebrides took part in our activities.

3. ACTIVITIES AND METHODS

Table 1 summarizes all operations conducted during the two visits to the New Hebrides. Figure 1 shows the area surveyed.

3.1 Tuna Fishing

Fishing and tagging techniques and the fishing equipment used were not modified from previous cruises.

Biological, meteorological and other relevant data were recorded in the same way as during previous surveys.

3.2 Baitfishing

As baitfishing was restricted to night baiting activities, the "bouke-ami" net previously described (Kearney 1977) was used exclusively throughout the New Hebridean survey. A minimum depth of 25 metres is required to work this net (it hangs 23 metres deep) and, together with the other requirements for "bouke-ami" fishing, it was anticipated that good results would only be obtained in areas with the following characteristics:

(a) protection from prevailing winds;

(b) little or no current;

(c) a minimum depth of 25 metres;

(d) a maximum depth of 40 metres (to enable retrieval of the anchor);

(e) proximity to extensive shallow (less than 50 metres) areas, preferably with freshwater inflow necessary to provide a suitable habitat for a sizeable baitfish resource.

Very few such areas exist in the New Hebrides which, unlike New Caledonia, does not have sizeable lagoons.

3.3 Scientific Procedure

3.3.1 Tuna Tagging

All three tagging cradles were used in the usual way and the tagging techniques previously developed were not modified.

Nearly as many fish were tagged in the bow cradle (573) as at the stern (580); 342 tuna (23%) were tagged amidships. As in New Caledonia the tagger working the stern cradle required an assistant.

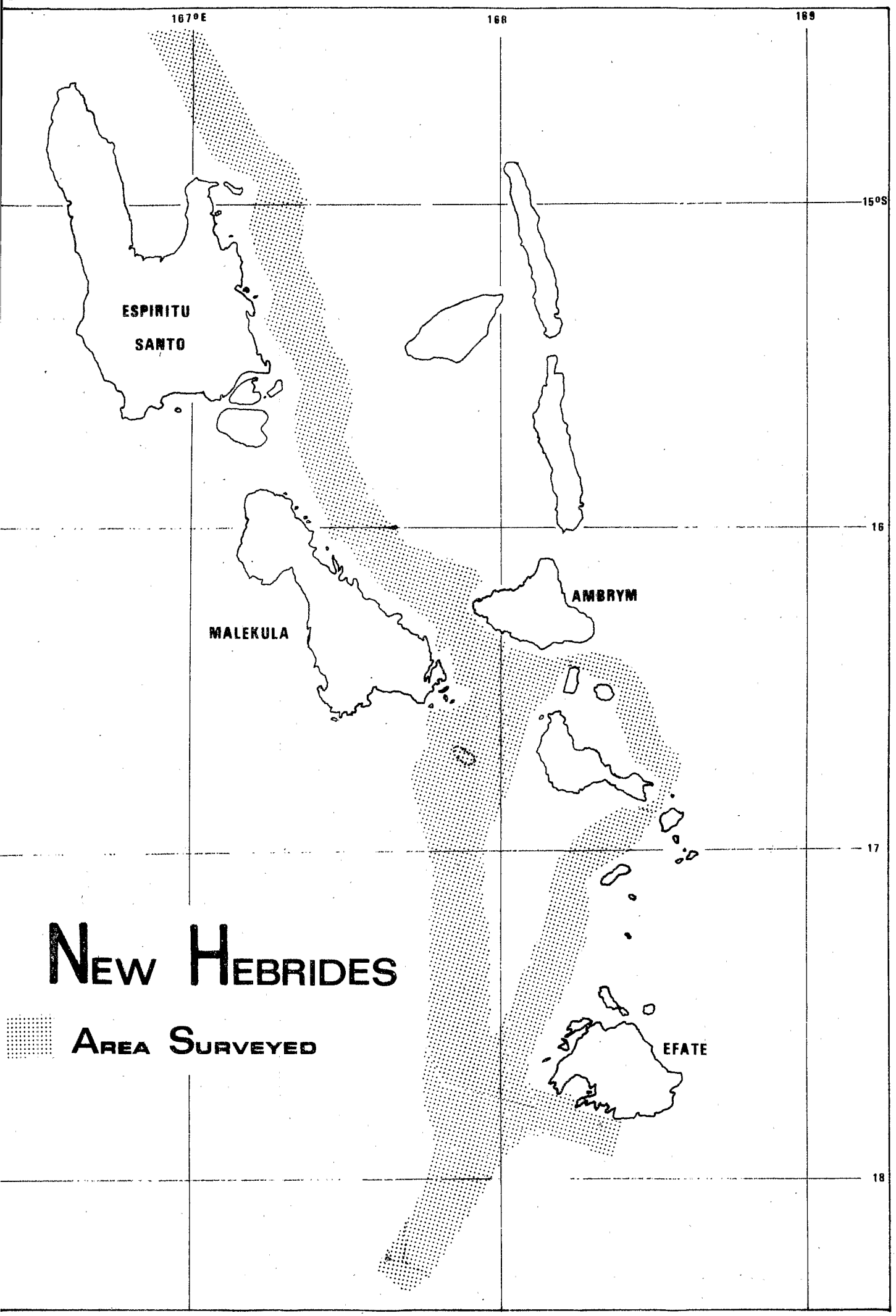
During the first cruise all fish were tagged with tags borrowed from the fisheries research section of the Department of Primary Industry in Papua New Guinea. During the second cruise, South Pacific Commission tags were used exclusively.

TABLE 1 : RESUME OF ACTIVITIES

DATE	GENERAL AREA	ACTIVITY	MOON AGE	BAIT HAUL NO.	BAIT STATION POSITION*	BAIT CARRIED AT COMMENCEMENT OF FISHING+	NO. OF FISH TAGGED
5/12	Torres Island - E. Santo Island	Fishing	24	-	-	-	-
6/12	Santo - Turtle Bay	Port	25	-	-	-	-
7/12	Turtle Bay - Port Stanley	Travel	26	1	15°20'S 167°10'E	5 bkts.	-
8/12	Port Stanley - Vila	Fishing	27	2,3	16°06'S 167°26'E	33 bkts.	51 SJ
9/12	Vila	Port	28	-	-	-	-
10/12	Vila - Lamap	Travel	29	-	-	-	-
11/12	Port Sandwich - Maskelyne	Fishing	01	4	16°25'S 167°46'E	5 bkts.	-
12/12	Malekula - Efate	Travel/ Port	02	-	16°31'S 167°47'E	-	-
13/12 through 19/1/78	"Hatsutori Maru" visited the waters surrounding New Caledonia						
20/1	Efate - Malekula	Fishing	11	-	-	296 bkts.	171 SJ
21/1	Epi Island -	Fishing	12	-	-	180 bkts.	758 SJ 220 YF
22/1	Port Stanley - Ambrym - Epi Island	Fishing	13	5	16°06'S 167°26'E	80 bkts.	276 SJ 25 YF

* Bait hauls have been assigned to the day on which bait was used for fishing, i.e. activities from 1800 hours have been assigned to the following day.

\+ The number of buckets has been expressed in each case in terms of standard 1.5 kg wet weight of bait.


167°E
168
169
15°S
16
17
18
ESPIRITU
SANTO
MALEKULA
AMBRYM
EFATE
NEW HEBRIDES
AREA SURVEYED

At the end of the New Hebrides campaign (both cruises) a total of 1,256 skipjack tuna had been tagged; 1,226 single tagged and 30 double tagged. In addition, 245 yellowfin tuna were tagged; 242 single tagged and 3 double tagged. No other species was tagged in the New Hebrides.

3.3.2 Tuna Biology

Specimens of tuna and other pelagic species that were poled or trolled, but not tagged and released, were analysed as in previous surveys and the following biological data was obtained; length frequency distribution, length/weight relationship, sex ratios, gonad weight and stages of maturity, stomach content.

In addition, as in New Caledonia, blood samples were taken:

- Sample C : 22 blood specimens from large-sized skipjack ($\bar{x}$ = 666 mm) belonging to two different schools, but in the same area, on 20 January 1978.

- Sample D : 73 specimens from the same school found on the western tip of Ambrym Island on 21 January 1978.

Basic biological data collected on fish that were not tagged from each school are summarized in Table 2.

3.3.3 Baitfish

The baitfish catching and handling techniques developed in Papua New Guinea and the Solomon Islands (Kearney 1977, Kearney and Lewis 1978) were used throughout the work in the New Hebrides. During the second part of the survey the techniques for improving the survival of baitfish were thoroughly tested when the baitfish captured at Port Bouquet, New Caledonia, were transported live to the New Hebrides where they were successfully used for skipjack fishing.

All data collected was recorded in appropriate logs. A sample sheet of each log type is given in Appendix.

RESULTS

4. SURVEY RESULTS

Unlike the countries previously visited, the New Hebrides had not been the site of extensive fishing surveys. The only useful information available stemmed from two brief Japanese surveys of baitfish resources in New Hebridean waters (JAMARC 1972, 1973). Thus the visit by the Skipjack Programme to the New Hebrides was anticipated to be of unprecedented value from a survey point of view. However, as the Programme is equally involved with assessment of the tuna and baitfish resources of the region, it is not feasible to devote time exclusively to survey work when there is no prospect for tagging tunas which may be encountered. The first cruise was therefore cut short when it became obvious that it was not possible to catch sufficient bait to fish successfully. As mentioned previously the survey was to be resumed if a solution to the bait problem could be found.

The schools sighted throughout the survey are summarized in Table 3.

TABLE 2 : SUMMARY OF BIOLOGICAL DATA

SPECIES	TOTAL NO. MEASURED	TOTAL NO. WEIGHED	TOTAL NO. EXAMINED FOR SEX	TOTAL NO. OF GONAD EXAMINED	TOTAL NO. EXAMINED FOR STOMACH CONTENT
Skipjack	269	125	148	148	86
Yellowfin	63	18	16	16	13
Frigate Tuna	7	7	7	7	7
Mackerel Tuna	4	4	4	4	4
TOTALS All species	343	154	165	177	110

TABLE 3 : RESUME OF SIGHTINGS

(SJ = skipjack, YF = yellowfin, MT = mackerel tuna, RR = rainbow runner, FT = frigate tuna, UNID = unidentified)

DATE	NO. OF HOURS SPENT SEARCHING	NO. AND SPECIES OF SCHOOLS	NO. OF SCHOOLS CHUMMED	NO. OF POSITIVE RESPONSES
7/12	5	1 SJ, 1 UNID	-	-
8/12	5.5	3 SJ, 2 SJ+YF	3	1
10/12	10	1 SJ, 5 UNID	-	-
20/1	12	6 SJ, 1 UNID	7	5
21/1	12	2 SJ, 1 SJ+MT+RR 1 SJ+YF	3	2
22/1	11.5	4 SJ, 1 SJ+YF 1 SJ+YF+FT+RR, 3 UNID	5	4
TOTALS	56	17 SJ, 4 SJ+YF, 12 others.	18	12

5. ASSESSMENT

5.1 Tuna

The areas where the highest apparent abundance of surface schooling tunas were encountered were the Chauliac shelf, south of Malekula, the area between the east coast of Malekula and the western tip of Ambrym Island and the south east of Lopevi east of Epi. The area between Malekula and Ambrym was the site of fishing by the Lamap-Malekula Fishing School vessel, the results of which are given in Table 4.

TABLE 4 : TUNA FISHING BY THE LAMAP FISHING SCHOOL VESSEL (Hallier, 1977)

	July	August	Sept.	Oct.	Nov.	Dec. 1975
Skipjack and other tuna (catch in kg)	49	-	-	83	371	209

5.1.1 Skipjack Occurrence of Special Interest

On January 20, 1978, approximately 30 miles west of the coast of Efate, good catches of very large skipjack were taken from two schools. In all 143 fish were taken for an estimated total weight of 950 kg. One hundred and twenty of these fish were tagged and released. The size composition of the fish taken from the two schools were as follows:

1st school - mean length = 65.5 cm, range 51.0-78.0 cm, average weight = 6.2 kg;

2nd school - mean length = 68.9 cm, range 60.8-78.0 cm, average weight = 7.5 kg.

A blood sample for genetic studies was taken from these very large fish but unfortunately it was small, comprising only 22 bloods. More of these large skipjack would have been landed had they not been too large for easy poling, particularly from the bow where several poles were broken in attempts to lift them.

During the second part of the survey one skipjack was captured (on 21 January 1978) which had been tagged on 8 December 1977 during the first cruise. The positions of release and recapture were almost identical.

5.1.2 Juvenile Tuna

Large numbers of juvenile tunas were taken from skipjack stomachs during the survey; 139 juveniles from 23 skipjack. No juvenile tunas were taken from the stomachs of yellowfin tuna, but it must be noted that most of the yellowfin were taken in areas where skipjack stomachs also contained no juveniles.

5.1.3 Yellowfin Tuna

Of the fish tagged in the New Hebrides 16.3% were yellowfin tuna. This percentage is higher than for Papua New Guinea, Solomon Islands or New Caledonia. The average size of those tagged was 53 cm, but two possible size classes were detected; the first from 47 to 60 cm and the second from 64 to 69 cm (see Figure 2).

The yellowfin tagged were taken from mixed schools and it was noted that the yellowfin were generally taken from the second half of the period over which any school was fished.

5.1.4 Other Species

Catches of tuna species other than skipjack and yellowfin tuna were few and of little interest. In all only four mackerel tuna *(Euthynus alletteratus)* and six frigate tuna (*Auxis thazard*) were taken.

5.2 Assessment of Natural Baitfish

Table 5 summarizes the baitfish results for both sections of the survey and in addition to local data also gives the figures for the bait catches taken at Port Bouquet and subsequently carried to the New Hebrides, Due to a shortage of suitable anchorages only 5 localities in the New Hebrides were investigated (see Figure 3), two of them (Port Stanley and Port Vila) twice.

In general the catches taken were poor (see Survey Results) and the survey provided, therefore, little reason for optimism with regard to night baiting in the New Hebrides, basically confirming the conclusions of the two previous surveys. It will certainly be possible to trv other areas on subsequent visits and the same areas in different months, and the chances of consistent success, perhaps using a lampara net or a lift net, also warrant consideration.

5.3 Baitfish Research

When sufficient quantities of baitfish could not be found in New Hebridean waters during the first cruise, the second of the two alternatives described in the Introduction was adopted. In this major baitfish experiment a load of live bait was carried from the east coast of New Caledonia to the central area of the New Hebrides, some 250 miles away, where it was successfully used to tag some 471 skipjack and yellowfin tuna.

Bait was captured on two successive nights, 17 and 18 January 1978, at Port Bouquet, New Caledonia, in four hauls for a total of 427 standard buckets (1.5 kg). Two hauls (162 buckets) were loaded at night and the remainder (265 buckets) during daylight. In all, four tanks were used to accommodate the bait.

Figures 4, 5 and 6 show the total cumulative mortality, the cumulative mortality in each bait tank respectively and mortality curves for the major species, *Stolephorus heterolobus* and fusiliers, predominantly *Gymnocaesio gymnopterus*. When considering the implications of the results presented in these figures the following points should be noted.

FIGURE 2 : LENGTH FREQUENCY DISTRIBUTIONS OF SKIPJACK AND YELLOWFIN TUNA TAKEN IN NEW HEBRIDEAN WATERS

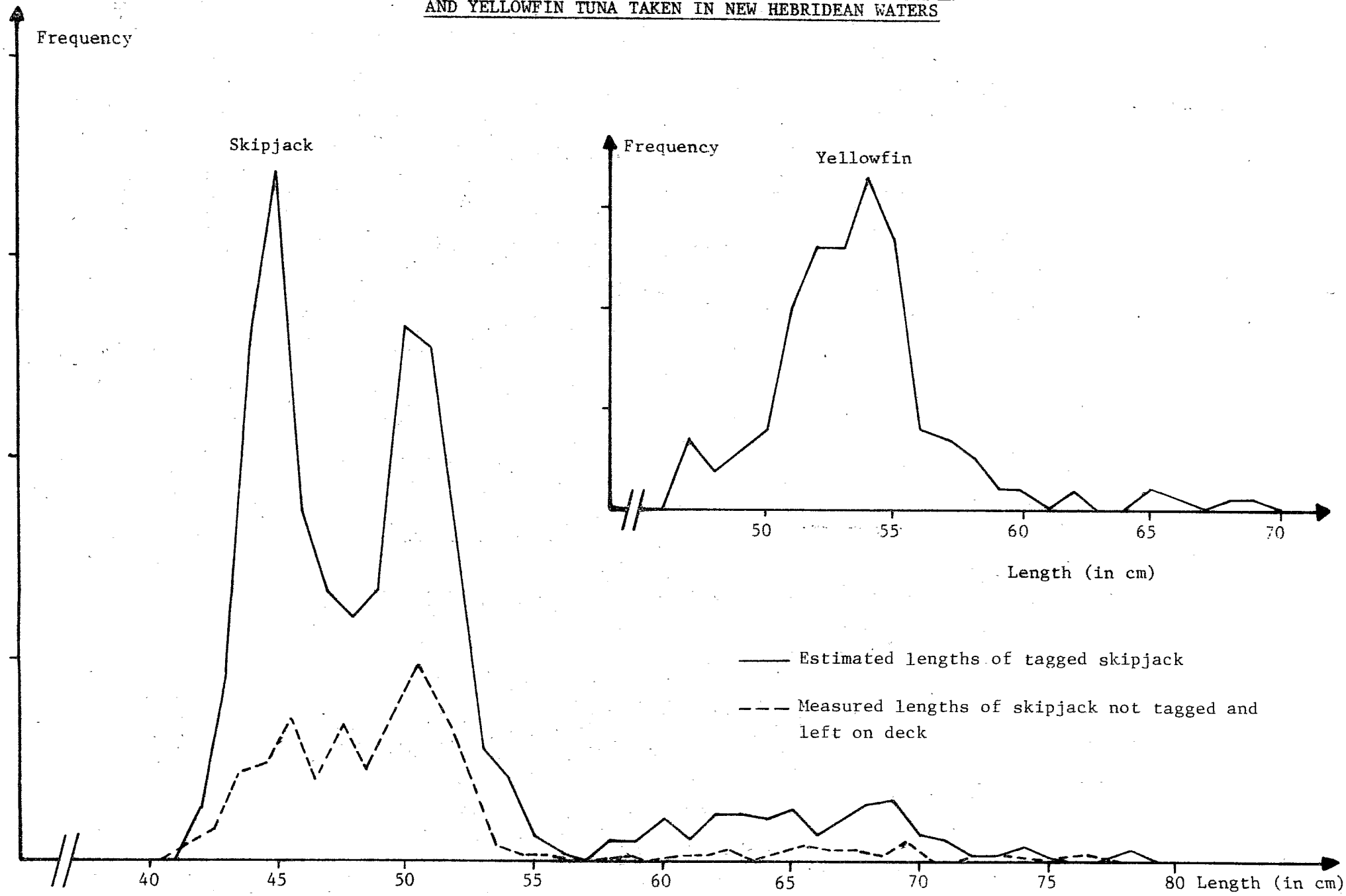


TABLE 5 : CATCH DETAILS AT EACH BAITFISHING SITE

ANCHORAGE	BAIT CATCH PER HAUL	DOMINANT SPECIES IN ORDER OF NUMERICAL ABUNDANCE	SIZE RANGE (mm)	MEAN (mm)	OTHER COMMON SPECIES
Turtle Bay	9	*Rhabdamia cypselurus*	18-32	27.4	*Herklotsichthys punctatus*
		Stolephorus devisi	64-71	68.4	
Port Stanley	20,14,35	*Spratelloides delicatulus*	30-52	36.9	*Rhabdamia cypselurus*
		Allanetta ovalaua	22-66	46.9	
		Herklotsichthys punctatus	30-71	48.7	
Port Vila		No haul due to lack of bait (two different nights)			
Port Sandwich	40	*Stolephorus indicus*	94-115	104.7	*Pterocaesio pisang*
		Spratelloides delicatulus	26-42	32.5	*Pterocaesio* sp.
		Siganidae	24-27	24.8	
Maskelynes Island		No haul due to lack of bait.			
Port Bouquet, New Caledonia*	36,233, 76,32	*Stolephorus heterolobus*	47-73	64.5	*Spratelloides gracilis*
		Gymnocaesio gymnopterus	50-72	59.0	*Allanetta ovalaua*
		Herklotsichthys punctatus	70-80	75.6	Sphyraenidae

Average catch per haul = 23.6

Average catch per night fished = 16.8

* These baitfish were caught in New Caledonia and then transported to the New Hebrides.

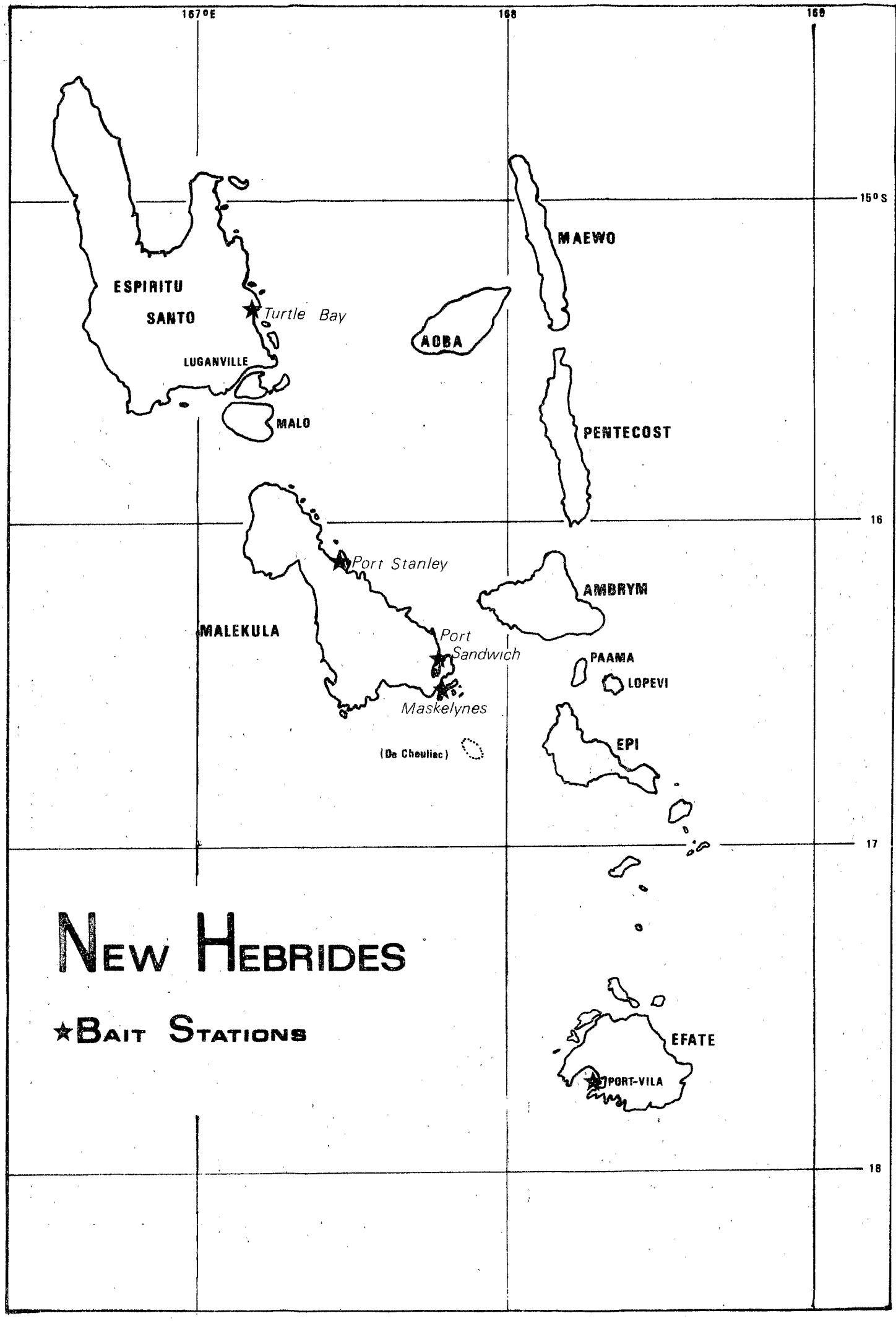
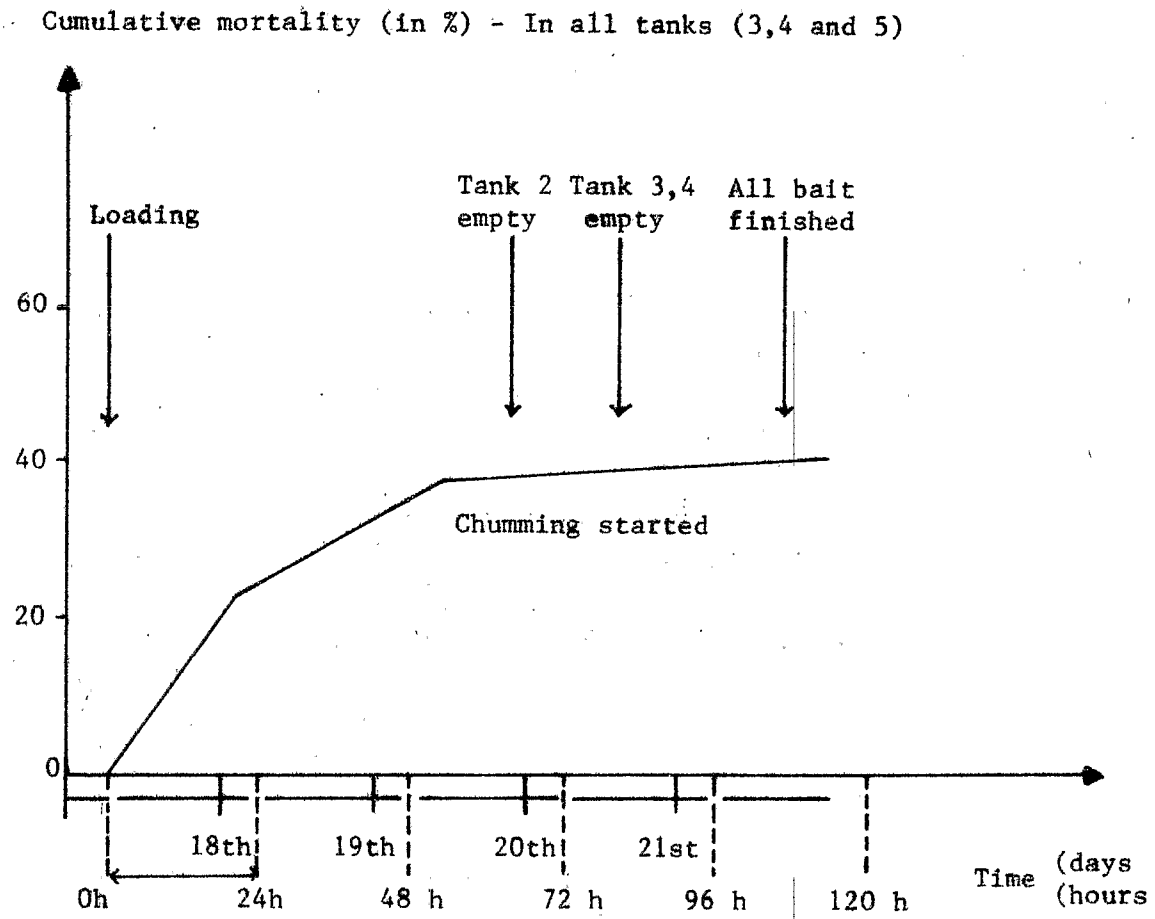

167°E
168
169
15°S
16
17
18
ESPIRITU
SANTO
Turtle Bay
LUGANVILLE
MALO
AOBA
MAEWO
PENTECOST
Port Stanley
MALEKULA
Port
Sandwich
Maskelynes
(De Cheuliac)
AMBRYM
PAAMA
LOPEVI
EPI
EFATE
PORT-VILA
NEW HEBRIDES
★BAIT STATIONS

FIGURE 4 : TOTAL CUMULATIVE BAITFISH MORTALITY IN BAITFISH CARRIED FROM NEW CALEDONIA



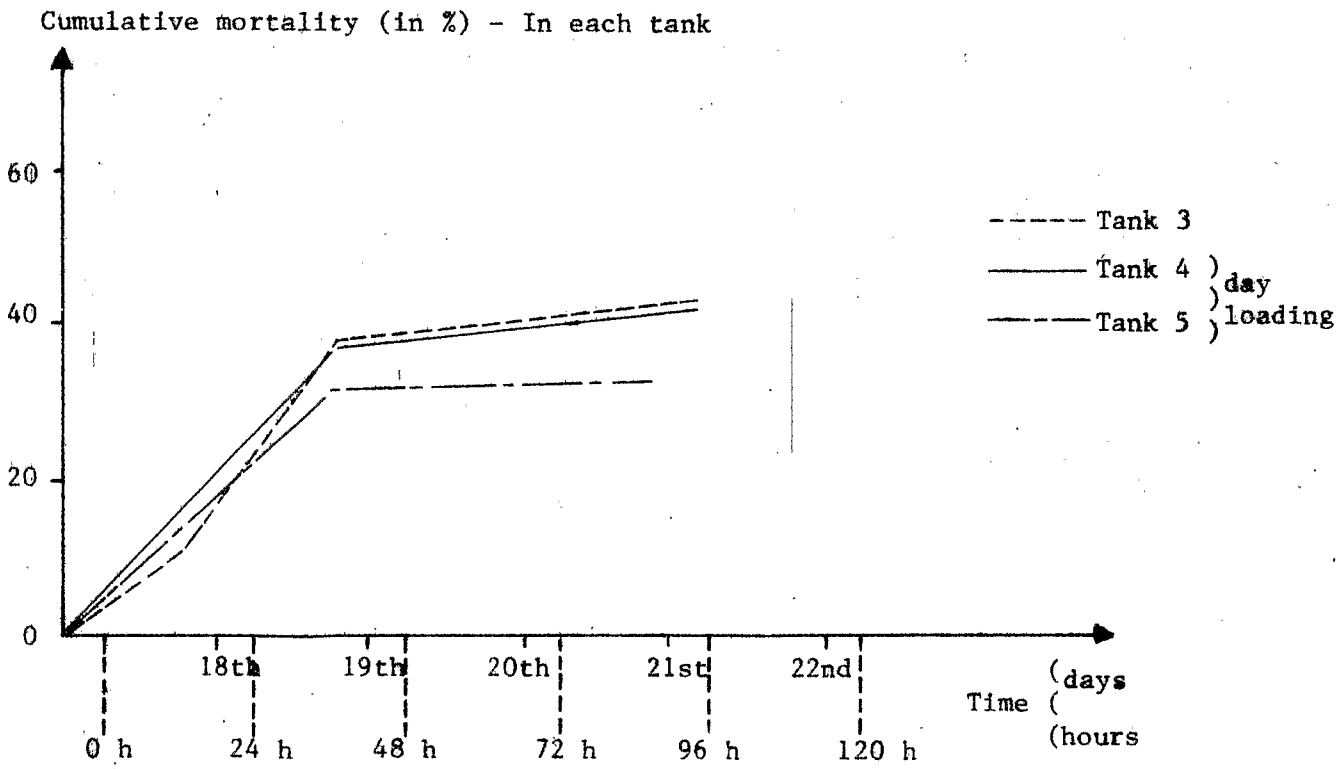
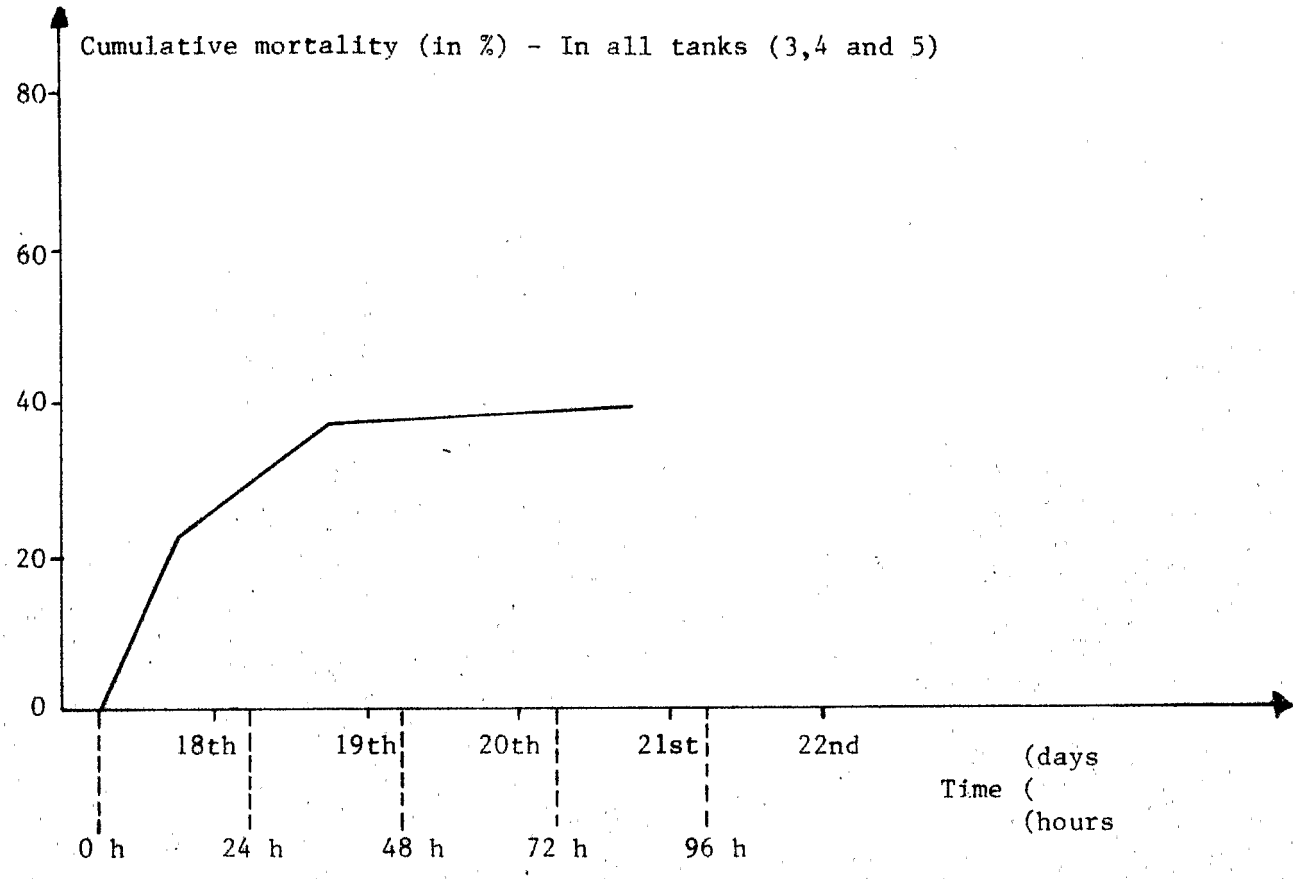


FIGURE 5 : TOTAL CUMULATIVE MORTALITY FOR *STOLEPHORUS HETEROLOBUS*



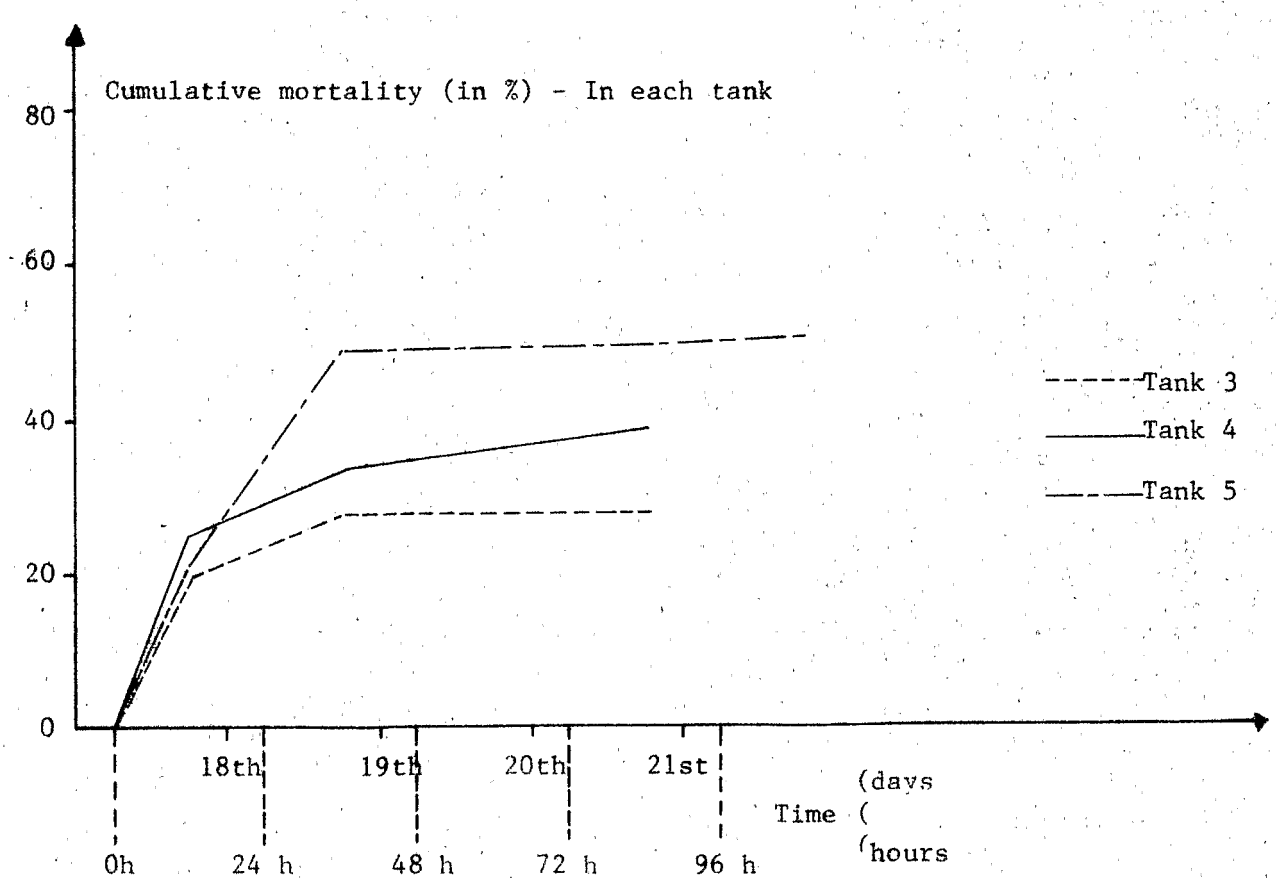
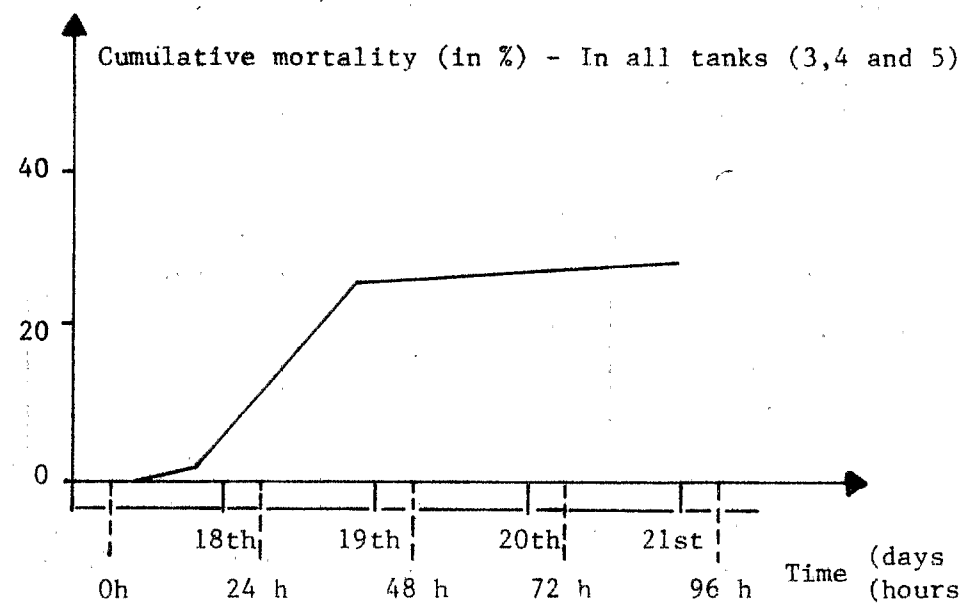
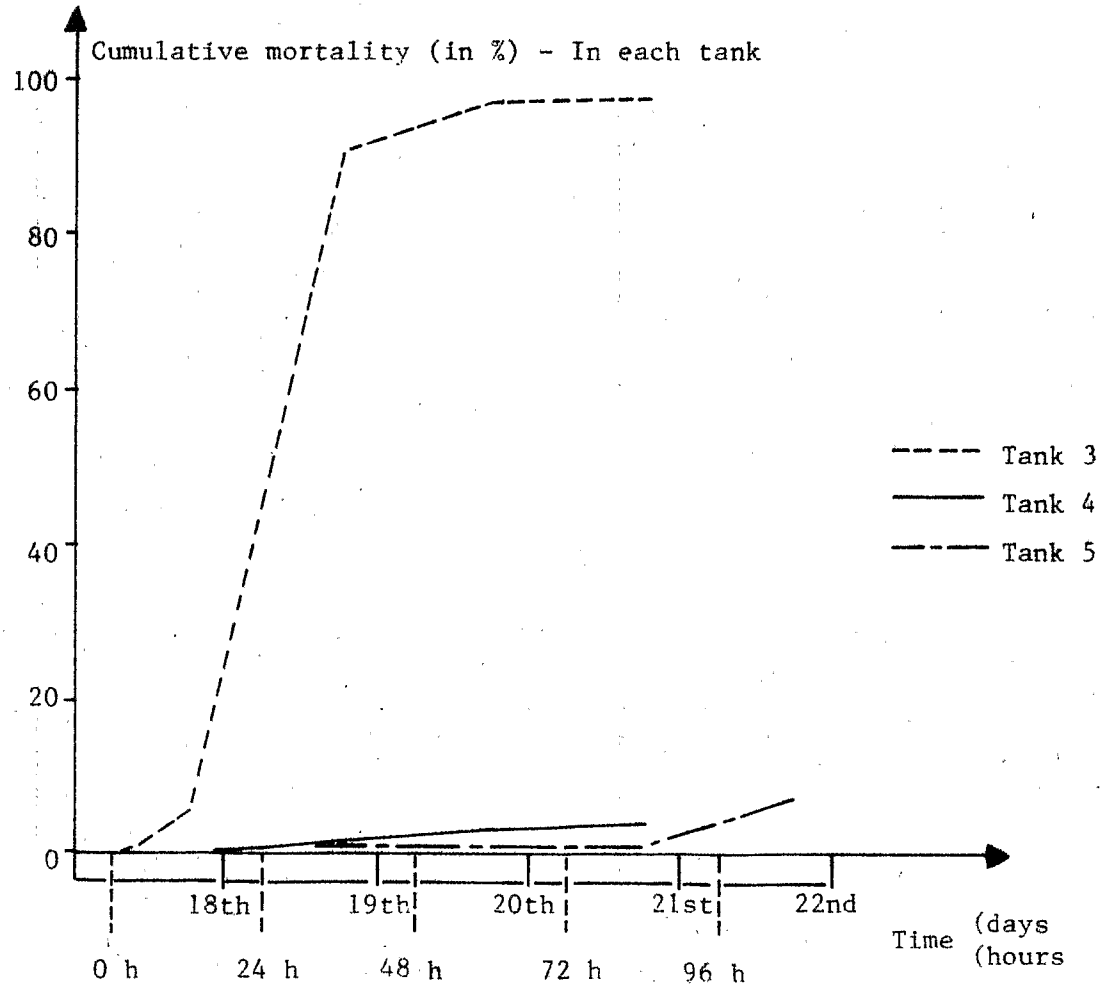


FIGURE 6 : TOTAL CUMULATIVE BAITFISH MORTALITY FOR FUSILIERS PREDOMINANTLY *GYMNOCAESIO GYMNOPTERUS* CARRIED FROM NEW CALEDONIA





(1) The total mortality for tanks 3, 4 and 5 (i.e. 73% of the bait carried) slightly exceeded 40%. This is very similar to the only comparable previous experiment which was carried out in Papua New Guinea (see Kearney 1977). This 40% mortality excludes another important source of loss of bait, that is predation in the bait tanks by *Decapterus* and other larger fish present in the catch. This additional loss is reflected in the slight imbalance in the accounting of bait at the end of the experiment.

The overall mortality was much higher than expected and there are several possible factors for this occurrence:

(i) the net billowed due to strong current during one bait haul (the largest catch) causing damage to the bait;

(ii) this same haul was hampered by a moderate sea and some damage inevitably resulted;

(iii) two hauls were night loaded, which could have resulted in increased mortality;

(iv) on 18 January 1978 ships maintenance work was in progress involving much hammering and chipping which could have unsettled the bait already loaded.

(2) The mortalities in each of the four bait tanks used were not the same (for descriptions of each tank see Kearney 1977):

(i) only two days' data was available on tank number 2 since much of this bait was used on 20 January 1978;

(ii) the overall mortality in tanks 3 and 4 were very similar (see Figure 4) although the mortality incurred by each of the major species was quite different, the almost complete loss of fusiliers in tank 3 remains a mystery;

(iii) cumulative mortality was lower in tank 5 than for tanks 3 and 4.

(3) As anticipated the mortality of fusiliers was much lower than for *Stolephorus heterolobus*, even including the inexplicable loss in tank 3. It is felt that the mortality rate of *S. heterolobus* could be improved on in future experiments.

(4) An estimated 54 kg or 8% of the total bait was lost to predators within the bait tanks during this experiment. This may be an overestimate as it is somewhat higher than would normally be expected.

In general this bait-transport experiment must be classified as very successful, even if baitfish mortalities were higher than anticipated. The "Hatsutori Maru" had previously carried bait long distances, particularly in Papua New Guinea where a load of predominantly *Stolephorus heterolobus* was carried from the north coast of New Britain and used off the south coast of Bougainville Island (Kearney 1977), but this New Hebridean experiment was the first instance of *Stolephorus* anchovies being carried and used internationally.

6. CONCLUSIONS

The survey of New Hebridean waters was a most interesting one for all involved with the Skipjack Programme. Even though some of the Programme's activities were restricted due to an apparent lack of suitable baitfish, the overall results were most pleasing.

Good concentrations of skipjack were observed and these in general responded well to chumming. One thousand five hundred and one fish were tagged on the only six days on which bait was carried and this compares most favourably with the results from the other countries and territories the Programme has surveyed.

During the survey no really good baiting areas were found and it appears unlikely that any really large baitfish resources, suitable for capture by conventional techniques, will be found during future visits. However, the prospects for day baiting, or night baiting in shallower areas than can presently be fished by the "Hatsutori Maru", certainly warrants investigation.

The baitfish transport experiment proved beyond doubt that good catches of skipjack can be taken in New Hebridean waters with bait carried from neighbouring countries. The prospects for expanding on this initial success and for possible co-operative or even joint venture arrangements with adjacent countries should be evaluated.

We are extremely grateful for government approval to work freely throughout the waters of the New Hebrides; this approval greatly facilitated the Programme's work during the survey in the New Hebrides.

APPENDIX

SAMPLE SHEETS OF DAILY LOGS USED ABOARD

"HATSUTORI MARU"

DURING NEW HEBRIDES CRUISE

16°06'S
167°26'E

LOCATION: Port Stanley Malekula Island **CHART:** 1570 **DATE:** 21/1/78

DEPTH: 35 m. **BOTTOM:** fine sand and mud **CLARITY:** 2 3

LIGHT ON: 1810 **HAULED:** 0407

LIGHTS USED: 2000, 1500 W **NET:** Bouke ami net **OTHER:**

Total : 35 bkts. (1.5 kg) _____ T3

DOMINANT SPP:

		DOM.	CODE			
Spratelloides delicatulus	90%	D		$\bar{x}(10)$ = 37.0 Range	31	52
Rhabdamia cypselurus	5%	C		$\bar{x}(10)$ = 34.9 "	25	41
Allanetta ovalaua	3%	C		$\bar{x}(10)$ = 58.0 "	52	66
Herklotsichthys punctatus	2%	C		$\bar{x}(10)$ = 63.4 "	58	71

OTHERS:

	CODE		CODE		CODE
Pranesus pinqus					
Sardinella sirm					
Archamia zosterophora					
Selar boops					
Selar crummenophthalmus					
Bregmaceros sp.					
Chorinemus sp.					
Decapturus sp. (probably maruadsi - not checked)					
Balistidae					
Sphyraenidae					

NOTES: Moon very bright, sounder indication poor so decided to haul after the moon set at 0400. As during the previous visit, good trace close to bottom, dimmed to 50 v. then 35 volts but did not rise above 15 m. - probably *R. cypselurus*. Good loading conditions - two trevallies in the net.

996/77

S.	D	
14528	49	SJ
409	10	YF
4	-	BE

ACTIVITY: Fishing

DATE 21/1/78

AREA: Epi Island
Port Stanley

NOON POSITION: 16°15'S 167°51'E

	WIND	SEA	S.S.T.	AIR TEMP.	CLOUD
0900	E - 10	2	28.9	28	50%
1500	ENE - 5-10	2	29.5	29	20%

BAIT CARRIED: 180(est.)bkts/ fus/H.p. USED: 130

MORTALITY: 5

RUNNING TIME: 0500 hrs to 1830 hrs. FISHING TIME: 0600-1800 (12 hours)

	S		D		S		D	OTHER
TAGS	768	SJ	1		217	YF	3	

OTHER SIGHTINGS: Nil

BIOLOGICAL DATA:

	GONAD	STOMACH CONTENTS	BLOOD	OTHER
SJ	48	24	74	
YF	6	6		
MT	2	2		
FM	1	1		

REMARKS:

Drifted ~ 8 miles due north during the night, indicating set from north as suspected. Steamed towards De Chauliac Bank - three medium-large schools - two responded, but biting never fierce; about 337 SJ tagged; clearly bank-associated; a good area.

Encountered large school near Ambrym at noon in perfect conditions - biting fiercely; 30 ~ 40% YF; one tag return from the school fished in the same general area previously.

Nothing else seen all afternoon despite excellent conditions.

Port Stanley 1830 hours - could not try new location since no chart.

The magic 15,000 reached nearly one month ahead of schedule!

t School

SPECIES: S	**NUMBER:** S 61 D –		**DATE** 21 / 1 / 78
TIME: 0720-0800 **hrs.**	**POSITION:** 16°45'S 167°56'E		**SCHOOL TYPE:** Jumper
TAGGER: ADL - Bow			

Tag No.	LCF.		Tag No.	LCF.		Tag No.	LCF.	
SPC A9460	51.5		A9486	52.5		A9511	47	
61	50.5		87	48.5		12	Lost overside	
62	48.5		88	50		13	51	
63	51.5		89	50		14	50	
64	52		90	52?	Not clear	15	48.5	
65	50		91	46		16	51	
66	48.5		92	47		17	46.5	
67	51		93	53		18	51.5	
68	53.5		94	46		19	51	
69	50.5		95	48		20	52	
70	51		96	50.5		21	51	
71	50		97	47		22	52	
72	51		98	43				
73	51		99	52			(61)	
74	51.5		A9500	50.5				
75	50		01	49		MEASURED FISH		
76	51.5		92	46				
77	52.5		03	Lost over side		$\bar{x}$(49) = 50.9		
78	52		04	50		436 - 587		
79	51		05	51				
80	52		06	47				
81	53.5		07	51.5				
82	51		08	50.5				
83	53		09	50.5				
84	51.5		10	48				
85	50	Tail damaged						

993/77

3rd School

BIOLOGICAL DATA

SPECIES: S

TIME: 1200 hrs

DATE 21 / 1 / 78

CAPTURE METHOD: Pole

S.S.T.: 289°C

POSITION: 16°15'S 167°51'E

SCHOOL TYPE: Very good biting in perfect conditions.

No.	LCF.	Wt.	Sex	Stage	G.Wt.	GI	Stomach content
3191	450		F	3	29	31.8	
92	495		F	3	36	29.7	FR Megalopa
93	523		F	3	77	53.8	
94	500		M		53	42.4	
95	525		F	3	95	65.7	
96	521		F	3	38	26.9	
97	502		F	3	48	37.9	
98	490		F	3	31	26.3	Ch.
99	503		M		55	43.2	Ch.
3200	458		F	3	33	34.3	Fr.
01	538		M		90	57.9	Ch.
02	525		-				Ch.
03	488*		M		26	22.4	
04	516		M		60	43.7	
05	485		F	3	55	48.2	
06	440		F	2(3)	21	24.7	
07	472		F	3	53	50.4	
08	416		M		13	18.1	
09	490		F	3	50	42.5	Ch.
10	448		M		20	22.2	

REMARKS: * Fish 3203 was a recapture (No.4271) from same area 8/12/77.

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RECORDED: ADL **AREA:** Epi - Port Stanley **DATE:** 21/1/78

Time	Position	Species	Type	Assoc.	Size	CH.	Response	Catch Wt.	Catch No.	Tagged	SST.	
0710	16°45'S 167°56'E	SJ	Jumper	Birds	Medium	+	+ve	6 t.	274	225 SJ	29.0	Moving fast
		Some MT and RR		& Bank	Large				2 MT 5 RR			Scattered jumpers
0815	16°42'S 167°54'E	SJ	Jumper	"	Medium	+	-ve	-		-	28.6	
0850	16°39'S 167°53'E	SJ	Sub-surf.	"	Medium	+	+ve	25t.	132	122 SJ	28.9	
			occasional finner									
Three good schools near the bank, all medium or large but biting not particularly good - several current lines,												
possibly responsible for the temperature fluctuations.												
1200	16°15'S 167°51'E	SJ + YF	Sub-surf.	Birds	Large	+	+ve	18t.	(500SJ	421 SJ	28.9	Bit very well for quite
		+ AT	occasional jumper						(226YF	226 YF		a long period.
Nothing else seen, despite ideal conditions all afternoon.												

NOTES:

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