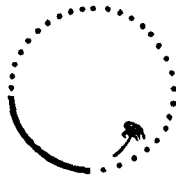
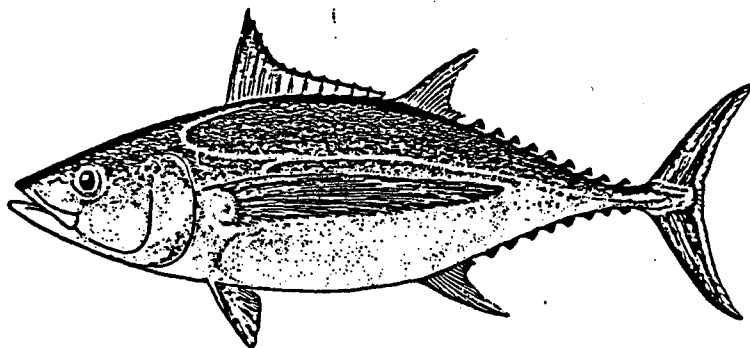


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**REPORT ON DROP-OUT OBSERVATIONS IN DRIFTNET FISHING**

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## INTRODUCTION

This report is a summary of the confidential report, "Cruise report of research onboard a large-mesh driftnet boat in the Tasman Sea in 1989", which was submitted in the Second Consultation on Arrangements for the Management of South Pacific Albacore Fisheries. Two tables were also revised from the previous report.

Survey activities were as follows:-

1. Period of the survey - 23 November-23 December 1989.
2. Areas surveyed - South western Pacific (Tasman Sea).
3. Name of the research vessel - *Shinhoyo Maru*.

### 1. RESULTS OF EXPERIMENTAL FISHING OPERATIONS

A total of 22 experimental operations were conducted and resulted in about 100 tons of total catch, mainly composed of albacore and skipjack. Summary of the operations and position of net settings are shown in Table 1 and Figure 1, respectively. The fishing site was usually chosen judging mainly from the sea surface temperature and direction of setting nets taking wind and water currents into account. However, sometimes the setting was made regardless of water temperature and wind direction when setting the net in the ordinary way might risk intersecting or interfering with other nets already deployed or was forced to stop setting by cutting the nets to avoid troubles. In addition, daily norm of 1000 nets were sometimes reduced due to bad weather condition and the situations previously mentioned.

The nets used in this experiment are made of nylon multi-stranded monofilament with a stretch mesh size of 178 mm, the same type used commonly by commercial driftnetters.

### 2. CATCHES

Catches by species during the 22 experimental operations are shown in Table 2. The number of fish is precise and accurate but total weight of fish is mostly estimated from average weight of the sample or converted from processed weight.

### 3. DROP OUT OBSERVATIONS

The drop out of the catches was observed by sighting from upper deck of the bow part where the sighting appeared to be made most effectively. A total of 136 sets (set consists of 100 nets) out of 194 sets in the total 22 operations were observed, in other words, 70% of the total operations were able to be sighted. Tables 3 and 4 show the results. A total of 371 (7.2%) out of 5162 albacore observed dropped out from the net. However, exclusion of 15 fish which were retrieved by gaff reduced the rates to 6.9%. The drop out rates of albacore observed for the operation No. 6 and later (after gaining practical drop out sightings) during which period the operation was substantial, were 7.3%, 348 out of 4764 fish. The drop-out rates of skipjack were 2.0% (97 out of 4807 fish), considerably lower than that of albacore.

Type of drop-out during the net retrieval were classified into six types, A to F, for the operation No. 9 and after (Table 5). The drop-out most frequently occurred in type E, about 50%, close to the boat

side, followed by type B, 18%, at the time of emerging from the water, followed by type A, about 10% in the water.

The fish enmeshed from the side of the net turned upward during the hauling hardly dropped out. There appears to be no apparent relationship between the drop-out rates and the size of the fish. However, more detailed study based on a large number of sets basis is necessary to verify this observation because the size of fish varies, often significantly, during the course of the operation.

#### 4. SIZE MEASUREMENTS

Figure 2 shows length frequency of albacore measured on board. The most dominant group has a peak in 67-68 cm class followed by a second peak in 75 cm class with very small numbers of fish less than 55 cm.

#### 5. DISCUSSION

The most reliable estimate for the albacore drop-out rate during the experimental operations is 7.3% for net with 178 mm mesh size. Although drop-out rate estimates for the net hanging in the sea were not attempted in this cruise, it is inferred from the observations that there is this type of drop-out and it should be surveyed in the future. The drop-out rates are preferable to be reduced as low as possible for the purpose of rational utilization of the resources. The following part is relevant to this matter and tries to find out the causes of the drop-outs from the experiments executed. The causes of the drop-out could be summarized, 1) Low net tension, probably results in weak enmeshing of the fish, tended to increase the drop-out rates, 2) It appears that the fish tended to drop-out more often when enmeshed in groups rather than in a solitary condition, 3) Fish enmeshed from the side of the net facing down during recovery tended to drop-out easily compared with ones enmeshed from the other side of the net, 4) Inappropriate installation of bulwark, ball-roller and net-hauler increases the drop-out rates, 5) Poor manipulation of net during the retrieval increases the rates. A skilled crew showed an excellent performance compared with less experienced crew.

Although it is generally said that bad weather causes higher drop-out rates, this was not the case in the present cruise. The various causes which increase the drop-out rates described previously could be eliminated by improving the technical aspects of the operation. Introduction of a catch net set along the boat's side like that being used by squid driftnetters to prevent the loss of fish after being dropped out might be considered.

Usage of the midwater driftnet indicated the by-catches of marine mammals, sea birds and marine reptiles could be substantially reduced. Although more study on this line of reducing the by-catches might be continued, application of this type of net to the commercial boats is a matter of high interest and should also be sought for in the future.

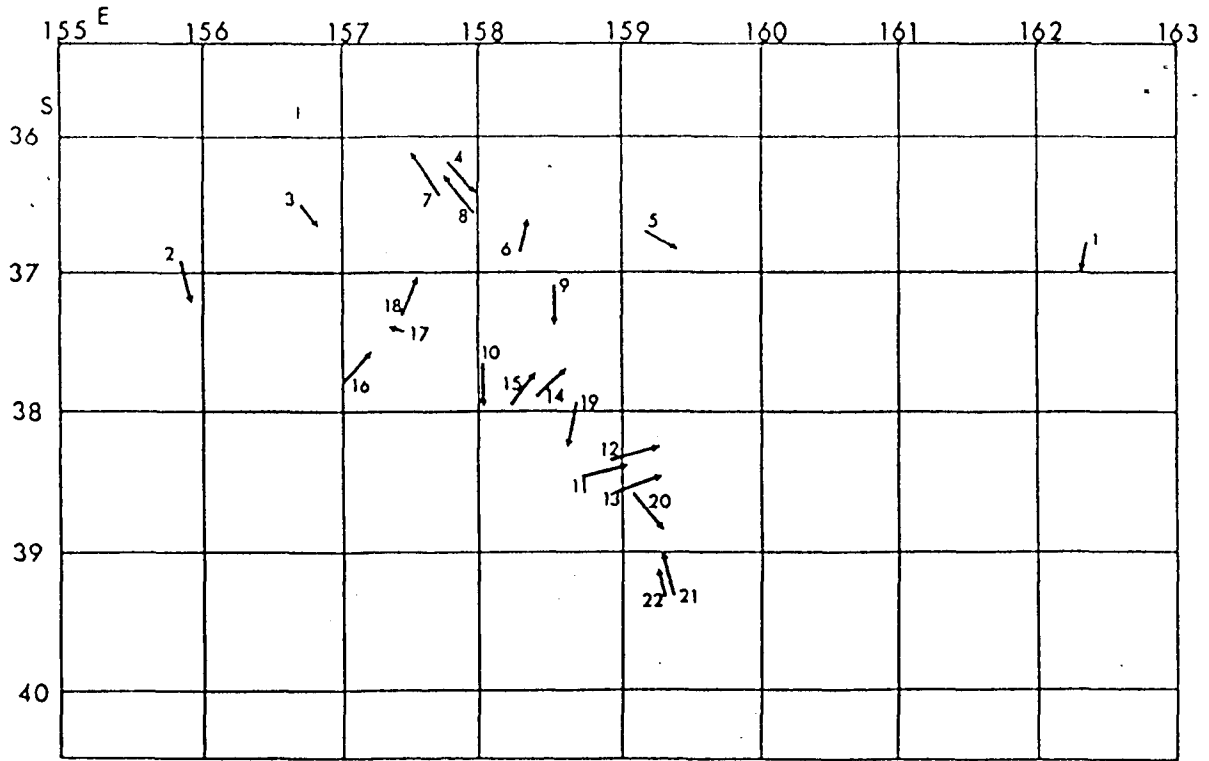


Figure 1. Location of drift net survey in the Tasman Sea  
(Number indicates Operation No.)

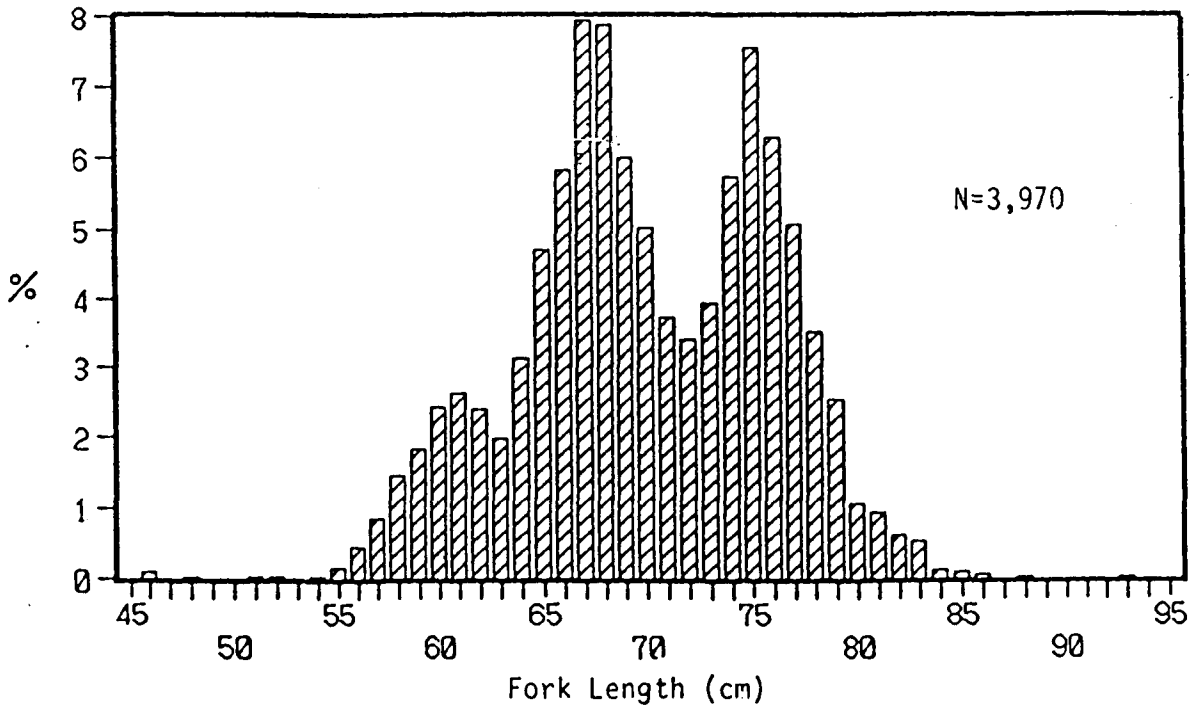


Figure 2. Fork Length Frequency Distribution of Albacore

Table 1. Records of Gillnet Operation

No.	Date	Location		Time of setting	Setting direction	No. of net (tan)	Weather	Wind direction	Wind force	Water temp. (°C)	Time of hauling	Total Catch	
		Lat.	Long.									No.	kg
1	11.23	36-45S	162-22E	1500~1710	180	800	bc	SSW	4	18.7	2230~0422	313	1,561
2	11.25	36-56	155-50	1437~1714	160	1,000	bc	SSW	5	18.7	2225~0950	5,140	15,874
3	11.26	36-30	156-41	1550~1730	150	600	c	SSW	6	18.6	2300~0610	3,230	8,263
4	11.27	36-11	157-47	1500~1706	150-155	800	c	SSE	6	19.6	2230~0515	1,522	6,322
5	11.28	36-41	159-09	1450~1700	140-130	900	bc	SE	4	18.2	2230~0610	643	3,854
6	11.29	36-51	158-17	1430~1635	20	840	bc	NE	3	18.3	2215~0610	634	3,312
7	11.30	36-25	157-43	1445~1725	330	1,000	bc	N	4	19.9	2245~0645	1,532	7,719
8	12. 1	36-33	157-57	1425~1655	330	1,000	bc	NNW	2	20.1	2245~0705	1,035	5,762
9	12. 3	37-05	158-32	1428~1648	180	900	bc	W	2	19.1	2230~0520	525	2,809
10	12. 4	37-38	158-01	1425~1655	180	1,000	bc	S	2	18.7	2245~0715	501	2,521
11	12. 5	38-29	158-42	1430~1650	70	1,000	bc	ESE	4	18.7	2245~0715	779	5,312
12	12. 6	38-21	158-55	1435~1648	70	800	c	E	6	18.6	2245~0545	873	5,726
13	12. 7	38-35	158-56	1423~1705	70	1,000	bc	ESE	4	18.5	2245~0640	904	5,213
14	12. 8	37-55	158-22	1427~1700	80-30	1,000	bc	ESE	5	18.7	2245~0720	567	4,142
15	12. 9	37-57	158-14	1425~1642	40	800	c	NE	5	18.7	2215~0445	375	2,400
16	12.10	37-47	157-01	1425~1640	40	800	bc	ENE	6	18.7	2245~0625	734	4,747
17	12.12	37-26	157-28	1437~1529	300	300	o	N	5	19.3	2030~2240	58	349
18	12.13	37-17	157-27	1422~1706	50-330	999	o	NE	3	20.3	2245~0745	704	5,077
19	12.17	37-56	158-41	1419~1705	190	999	o	SW	3	19.2	2245~0545	652	3,376
20	12.18	38-35	159-04	1430~1708	140	999	o	S	3	18.2	2245~0607	95	536
21	12.19	39-19	159-22	1417~1615	350	999	bc	NNE	3	19.2	2230~0610	489	1,943
22	12.20	39-20	159-19	1425~1650	350	799	c	NNE	6	19.0	2230~0450	630	2,910
Total						19,335						21,935	99,728

Table 2. Catch Records by Fish Species

No.	Date	Albacore		Skipjack		Yellowfin tuna		Bigeye tuna		Swordfish		Striped marlin		Blue marlin		Shortbill Spearfish	
		No.	Kg	No.	Kg	No.	Kg	No.	Kg	No.	Kg	No.	Kg	No.	Kg	No.	Kg
1	11.23	60	372	200	930					1	49						
2	25	300	2,130	1,539	6,772					3	181						
3	26	104	707	695	2,780					1	11						
4	27	156	1,139	1,175	4,583					2	31						
5	28	82	517	481	2,501					5	300						
6	29	220	1,397	342	1,590					1	28						
7	30	485	2,934	959	4,411					2	54						
8	12.1	248	1,562	720	3,312					3	209						
9	3	277	1,731	161	749					1	20						
10	4	285	1,667	69	317					4	254						
11	5	666	4,595	20	142					1	98						
12	6	506	3,441	335	1,776					1	47						
13	7	352	2,341	522	2,506					1	16						
14	8	471	3,603	9	40					1	157						
15	9	267	2,043	30	138					2	113						
16	10	600	4,050	82	385					1	8						
17	12	49	331	1	4					1	113						
18	13	333	2,647	227	1,180					2	180						
19	17	375	2,306	177	823					1	65						
20	18	40	232	24	118					1	8						
21	19	215	1,236							3	113						
22	20	354	2,195							1	8						
Total		6,445	43,176	7,768	35,057	5	89	4	165	32	1,576	13	1,098	1	198	5	80
		Slender tuna		Blue shark		Mako shark		Hammerhead shark		Pomfret		Flying squid		Others		Total	
1	11.23	1	9	1	32	3	23			37	67	2	7	8	72	313	1,561
2	25	-	-	3	280	8	496			3	5,904	3	7	3	32	5,140	15,874
3	26	-	-	1	96	5	211			2	4,356	1	2	1	14	3,230	8,263
4	27	1	8	-	254	3	147			168	302	6	20	7	38	1,522	6,322
5	28	1	32	-	82	3	103			52	94	8	11	5	26	643	3,854
6	29	1	9	-	82	4	155			54	97	10	22	2	14	634	3,312
7	30	6	39	1	82	8	56			61	110	4	9	6	24	1,532	7,719
8	12.1	8	57	-	130	4	174			34	61	10	22	2	8	1,035	5,762
9	3	2	16	2	130	2	4			70	126	4	9	6	24	525	2,809
10	4	-	-	-		4	12			133	239	2	4	3	10	501	5,321
11	5	14	109	-	138	2	24			63	113	7	4	4	27	779	5,312
12	6	11	80	2	138	3	113			9	16	2	4	3	17	873	5,726
13	7	10	72	-	86	3	19			10	18	2	5	-	10	904	5,213
14	8	16	107	1	86	2	48			58	101	5	7	1	10	567	4,142
15	9	11	74	-	63	3	148			49	88	15	33	2	10	375	2,400
16	10	3	20	1	63	3	148			44	79	1	2	-	10	734	4,747
17	12	-	-	-		3	253			8	14	1	2	-	3	58	349
18	13	2	14	2	142	1	4			126	227	3	7	2	3	704	5,077
19	17	-	-	-		1	7			84	151	8	6	6	8	652	3,376
20	18	-	-	-		1	43			21	37	5	19	6	29	95	536
21	19	-	-	-		1	7			252	453	-	13	6	61	489	1,943
22	20	1	7	3	102	4	43			259	466	5	11	7	16	630	2,910
Total		94	667	22	1,533	66	2,040	3	284	7,292	13,119	98	203	87	443	21,935	99,728

Table 3. Number of albacore entangled and dropped out by set (100 nets)

Set no. Op.no.	1	2	3	4	5	6	7	8	9	10	No. of Observed	Total Catch	Drop out Rate (%)
1	E D	7 0	3 0	5 0	10 0	4 0	22 1	5 0			61 1	60	1.64
2	E D	14 0	64 2	28 -	33 0	25 0	27 0	33 -	22 0	36	185 2	300	1.08
3	E D	11 0	7 0	24 -	13 -	33 1	18 -				69 2	104	2.90
4	E D	23 1	25 1	17 1	15 0	23 -	23 -	15 -			80 3	156	3.75
5	E D	1 0	2 0	6 -	2 -	8 -	21 -	8 -	24		3 0	82	0.00
6	E D	13 2	5 0	8 0	27 3	102 7(1)	10 1	12 0	4 0		237 18(1)	220	7.59
7	E D	26 1	26 1	35 7	136 10	64 4	61 3	52 7	37 -	19	468 39	485	7.17*
8	E D	6 1	26 4	19 2	15 -	7 -	69 -	27 -	40 -	28	51 7	248	8.33
9	E D	23 2	39 2	15 2	64 4	41 1	23 2	17 1	36 4		301 25(1)	277	13.73
10	E D	31 8	15 2	15 0	35 2	70 8	30 3(1)	32 3	38 3	44 9(2)	322 40(3)	285	7.97*
11	E D	21 1	65 4	121 5	45 3	71 9	51 2	37 4	170 4	94 6	706 40	666	12.42
12	E D	58 4	91 5	41 0	55 0	107 5	61 -	54 -			407 16	506	11.49*
13	E D	45 1	15 1	36 2	31 2	22 -	23 1	56 2	87 -	20 1(1)	255 13(1)	352	3.93
14	E D	73 11	67 6	78 10	54 -	62 7	25 3	34 -	37 4	40 3	435 52	471	5.10
15	E D	17 2	20 1	48 -	22 -	8 -	41 4	46 -			213 21(5)	267	4.71*
16	E D	17 2	37 2	25 -	20 2	5(1) 4(3)	4 4	140 3(1)			492 24(1)	600	11.95
17	E D	3 0	25 5(1)	29 3	5 -	106 -	10 -				56 8(1)	49	9.86
18	E D	34 2	25 1	51 8	34 -	26 3	47 3(1)	41 4	29 -	31 -	223 21(1)	333	7.51*
19	E D	25 4	40 3	27 5	26 -	34 4(1)	14 1	48 -	56 5	90 6	330 30(1)	375	9.42
20	E D	1 1	0 0	3 -	12 0	1 0	2 -	9 -	7 2	8 1	29 4	40	8.97*
21	E D	36 1	71 0	9 -	8 -	11 -	16 -	19 0	22 2	20 1	132 3	215	13.79
22	E D	1 0	10 -	12 -	37 -	49 -	54 -	87 -			107 2	354	2.27
Tota	E D										5162 371(15)	6445	1.87 7.19 6.90*

Remarks : E - Number of entangled fish includes dropped out fish

C - Number of dropped out fish

( ) - Number of recovered fish by gaff after dropped out

\* - Excludes recovered fish

Table 4. Number of skipjack entangled and dropped out by set (100 nets)

Set no.		1	2	3	4	5	6	7	8	9	10	No. of observed	Total catch	Drop out rate (%)
1	E	27	34	23	33	29	5	7	45			203	200	
	D	1	0	0	0	0	0	0	2			3		1.48
2	E	146	121	285	202	162	196	186	123	64	61	890	1539	
	D	1	1	-	3	0	1	-	-	1		6		0.67
3	E	111	125	152	107	108	94					438	695	
	D	1	0	-	-	0	1					2		0.46
4	E	136	123	174	167	173	186	130	99			600	1175	
	D	3	4	4	2	-	-	-	-			13		2.17
5	E	47	44	49	54	74	58	69	67	19		91	481	
	D	0	0	-	-	-	-	-	-	-		0		0.00
6	E	1	44	28	72	64	15	59	52	22		357	342	
	D	0	3	1	3	3	0	2	3	0		15		4.20
7	E	84	102	84	64	115	109	119	122	69	111	799	959	
	D	2	1	0	3	4	3	3	4	-	-	20		2.50
8	E	30	79	57	84	58	73	70	108	81	89	166	720	
	D	3	3	3	-	-	-	-	-	-	-	9		5.42
9	E	23	5	12	0	37	27	36	14	16		170	161	
	D	1	0	1	0	2	1	2	2	0		9		5.29
10	E	2	6	7	0	6	6	13	10	10	10	70	69	
	D	0	1	0	0	0	0	0	0	0	0	1		1.43
11	E	0	0	7	0	0	1	0	0	0	12	20	20	
	D	0	0	0	0	0	0	0	0	0	0	0		0.00
12	E	10	11	31	53	34	26	39	134			165	335	
	D	0	0	0	1	0	2	-	-			3		1.82
13	E	36	12	1	28	30	52	109	140	85	42	420	522	
	D	1	0	0	0	-	4	5	2	-	1	13		3.10
14	E	0	0	0	0	0	0	0	0	1	8	9	9	
	D	0	0	0	-	0	0	0	-	0	0	0		0.00
15	E	5	0	0	0	8	0	0	17			30	30	
	D	0	0	-	-	0	0	0	0			0		0.00
16	E	0	0	7	12	6	22	33	2			53	82	
	D	0	0	-	0	0	-	0	0			0		0.00
17	E	0	0	1								1	1	
	D	0	0	0								0		0.00
18	E	11	0	1	0	19	8	86	59	23	22	165	227	
	D	0	0	0	-	-	1	1	0	-	-	2		1.21
19	E	6	34	60	26	13	18	7	9	0	6	143	177	
	D	1	0	0	-	0	1	0	-	0	0	1		0.70
20	E	0	1	1	0	0	16	0	6	0	0	17	24	
	D	0	0	-	0	-	0	-	-	0	0	0		0.00
21	E	0	0	0	0	0	0	0	0	0	0	0	0	
	D	-	0	-	-	-	-	-	0	0	0	0		0.00
22	E	0	0	0	0	0	0	0	0			0	0	
	D	0	-	-	-	-	-	0	-			0		0.00
												4807	7768	
												97		2.02

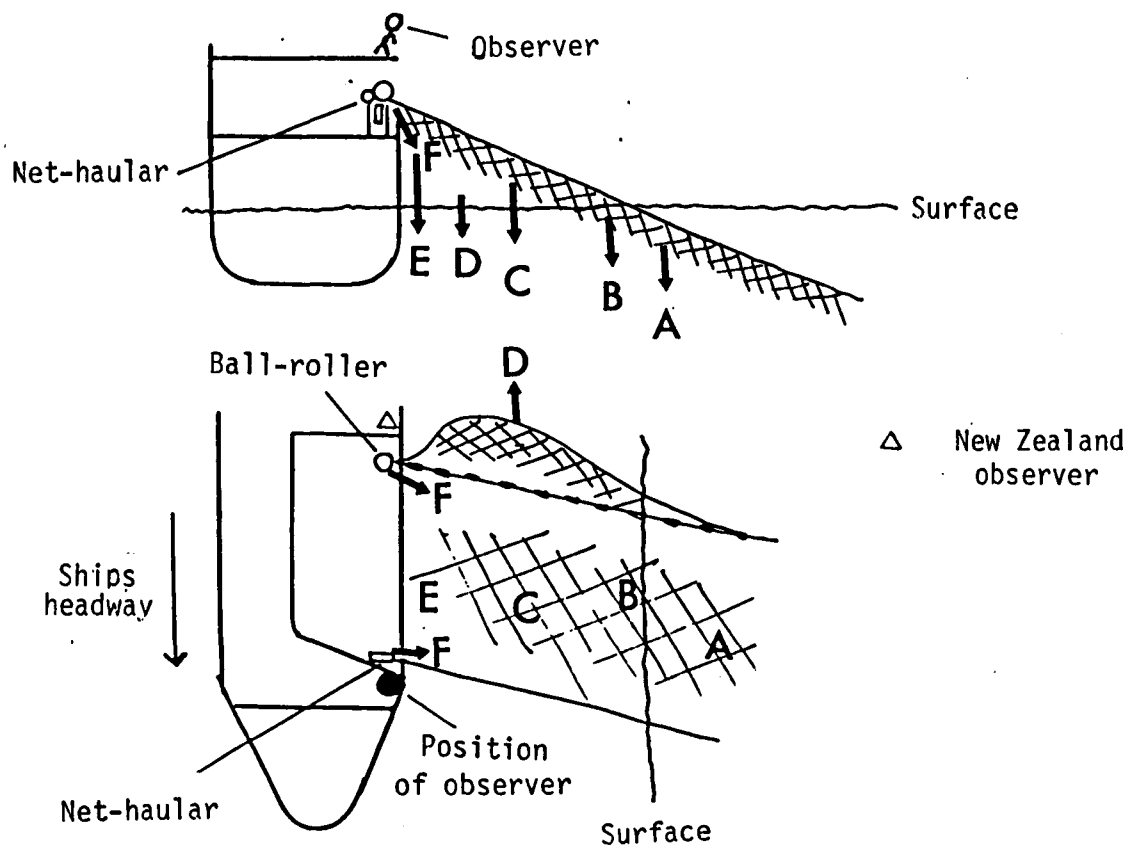


Table 5. Number of Albacore Drop-outs on Haul Back by Zone

Zone No.	A	B	C	D	E	F	計
9	3	6	2	0	10	4	25
10	2	11	2	4	19	2	40
11	1	4	3	8	20	4	40
12	2	3	1	1	8	1	16
13	0	4	2	1	5	1	13
14	8	6	7	6	24	1	52
15	0	7	2	3	9	0	21
16	4	3	2	2	12	1	24
17	2	1	0	0	5	0	8
18	1	3	2	2	9	4	21
19	4	5	1	2	16	2	30
20	1	0	0	0	2	1	4
21	0	0	1	0	1	1	3
22	0	0	0	0	2	0	2
Total (% of total)	28 (9.4%)	53 (17.7%)	25 (8.4%)	29 (9.7%)	142 (47.5%)	22 (7.4%)	299 (100%)

## Classification of drop-out by zone

- A: Drop-out subsurface
- B: Drop-out at surface
- C: Drop-out by hanging fish
- D: Drop-out from current due to ships headway
- E: Drop-out near ship side
- F: Drop-out due to mechanical action at ships gunnel and by net-hauler or ball-roller



## Taiwanese Longline for area 00 - 20S.

## Taiwanese Longline for area 20S - 30S.

## Taiwanese Longline for area 30S - 60S.

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Year	100s Hooks	No of Alb	CPUE	Year	100s Hooks	No of Alb	CPUE	Year	100s Hooks	No of Alb	CPUE
67	146189	595009	4.070	67	32867	225436	6.859	67	3645	34454	9.452
68	185447	672372	3.626	68	31194	182488	5.850	68	2826	27909	9.876
69	137887	445229	3.229	69	15280	100006	6.545	69	2401	34435	14.342
70	161813	641198	3.963	70	17543	97074	5.533	70	791	8346	10.551
71	284800	791775	2.780	71	63479	374381	5.898	71	15772	124484	7.893
72	316090	824243	2.608	72	89536	507680	5.670	72	8597	69643	8.101
73	376602	877912	2.331	73	147005	669829	4.557	73	30450	178226	5.853
74	255152	418776	1.641	74	121192	311871	2.573	74	136572	597560	4.375
75	210608	362876	1.723	75	67369	189567	2.814	75	73668	271171	3.681
76	24519	53201	2.170	76	12356	59516	4.817	76	2341	5413	2.312
77	275995	669112	2.424	77	116485	667436	5.730	77	15175	97734	6.440
78	206100	544927	2.644	78	73981	444649	6.010	78	39647	216389	5.458
79	196565	417311	2.123	79	71896	317924	4.422	79	24312	83075	3.417
80	349946	699949	2.000	80	240703	998958	4.150	80	41862	140586	3.358
81	226109	379348	1.678	81	97130	312184	3.214	81	51071	180709	3.538
82	158016	321748	2.036	82	59850	192763	3.221	82	35801	184626	5.157
83	97189	204610	2.105	83	52738	242586	4.600	83	22966	106367	4.631
84	124478	208401	1.674	84	54519	158989	2.916	84	23921	102312	4.277
85	83255	160393	1.927	85	42310	158887	3.755	85	18043	99828	5.533
86	72942	184433	2.528	86	32195	171403	5.324	86	11820	113166	9.574
87	85863	204812	2.385	87	43549	163312	3.750	87	32962	137950	4.185
87*	71044	195172	2.747	87*	46344	173456	3.743	87*	41766	175201	4.195
88*	53368	146461	2.744	88*	27184	86508	3.182	88*	19477	67399	3.460

Note: Source of data for 1967 to 1987 is Published Statistics on Catch and Effort of Taiwanese Longline Fishery.

\* Source of data for 1987 and 1988 is aggregated data of Taiwanese Longline Vessels offloading in Pago Pago, supplied by NMFS.