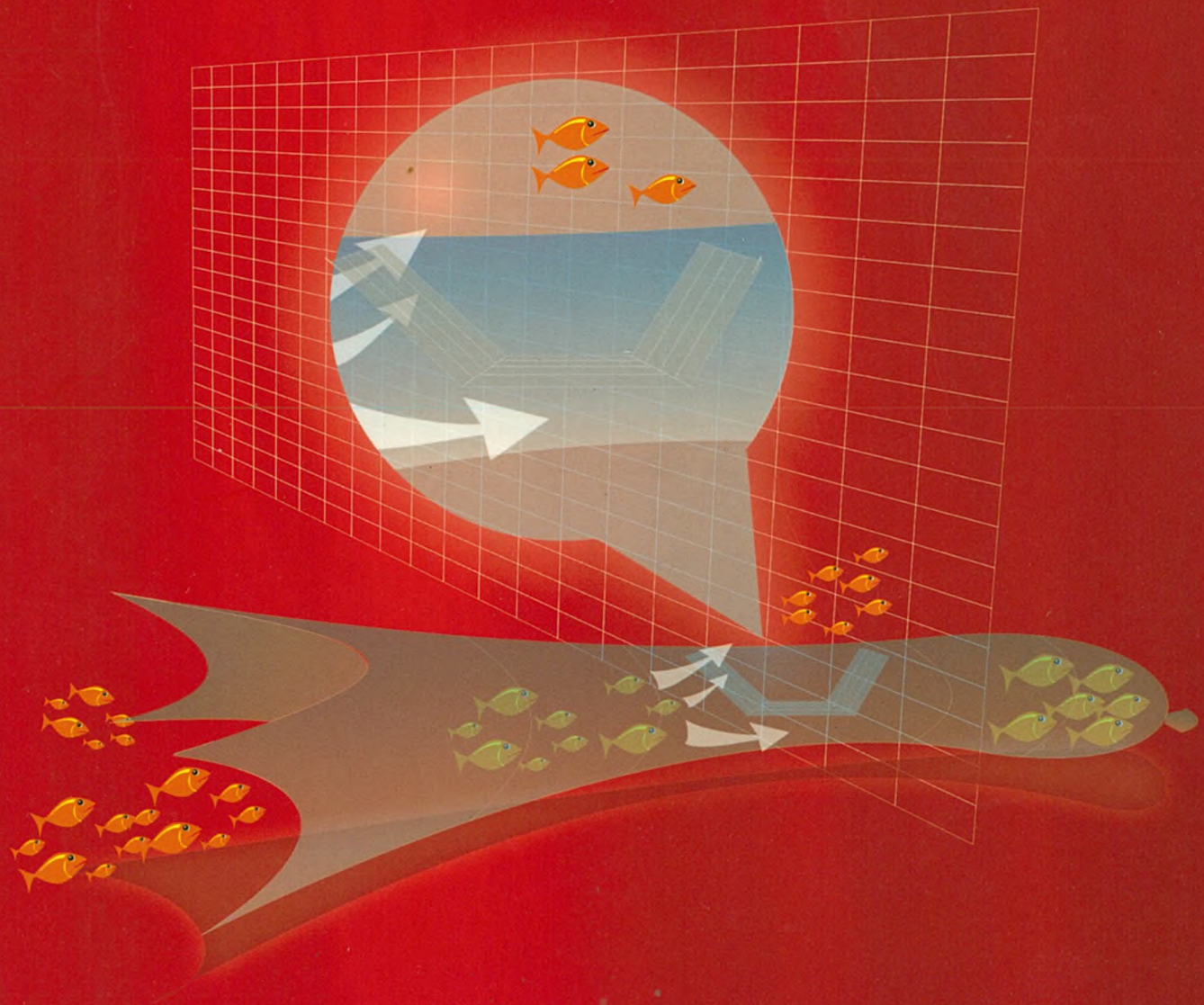
STUDY ON

JTEDs

JUVENILE AND TRASH EXCLUDER DEVICES IN THE VIETNAM



SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
TRAINING DEPARTMENT

TD/RES/84

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ABSTRACT

This SEAFDEC Training Department has carried out series of experiments to reduce the level of unwanted catch including juvenile and trash fish. SEAFDEC planned to conduct the experiments using JTEDs installed in bottom trawl used in the Southeast Asia region. This paper deals with the third experiment conducted in Vietnam to study the reduction of unwanted catch using a rigid sorting grid with differences bar spaces.

The results indicated that the escape percentage using the rigid sorting grid was in a range from 12-28% or trash fish, and from 10-40% for other kinds of fish. This suggests that the rigid sorting grid has a better separating performance than that of rectangular and semi-curved JTEDs for reducing unwanted fish.

KEYWORDS: Bottom trawl, Juvenile and Trash Excluder Devices (JTEDs)

Introduction

Trawl fisheries, particularly in tropical waters, produce enormous unwanted catch called "trash-fish", which are usually discarded back to the sea either dead or dying. Recently, trash fish are being retained and ground into fishmeal for export for feed in shrimp production in marine farms. It can be said that this is a loss of many tons of valuable food fish that might otherwise have satisfied vital local requirements for protein. The unwanted catch includes undersized commercially valuable fish, mostly in the juvenile stage, which contributes to a reduction of fish stock. It is now vital that the natural resources are harvested selectivity to eventually improve the yield.

In consideration of the issue of the contributory factors in resource depletion, SEAFDEC carried out a series of research on juvenile and trash fish reduction using Juvenile and Trash Excluder Devices (JTEDs), which are installed in bottom trawl nets. This is also aimed at promoting the use of selective devices in fishing gear for the fishing industries of the Southeast Asian region.

The first experiments using rectangular shaped and semi-curved JTEDs were carried out in Thailand in 1998. It was suggested that there was no significant difference in the escape percentage of commercial fish by weight as compared between the two types of JTEDs. However, the escape percentage of fish by numbers using the semi-curved JTEDs was about 7 times higher than that of the rectangular JTEDs. It was found that 50% of trash fish could be released from the trawl net with semi-curve JTEDs installed. On the basis of the collected data of the first experimental results suggested that improvements of JTEDs for bottom trawl nets are needed for more selective performance.

The second experiments on JTEDs for trawl nets were carried out in Brunei. These were to investigate the catch and release efficiency of JTEDs using a rigid sorting grid and another with no grid but using two codend nets. It was found that the rigid sorting grid has a higher separating performance than that of a two codend net. For rigid sorting grids installed in bottom trawl nets, it was felt that a difference in the width of the bar spacing of the sorting grid should effect its release performance. For this reason, a third experiment was carried out to study the release performance of the rigid sorting grid having different widths of bar space.

This paper presents the results and discussion of the third experiment for JTEDs with different bar spacing in the sorting grid. This was carried out along the coast of Vietnam. The separating performances of rigid sorting grids in trawl nets are presented in this paper.

Materials and Methods

This experiment was conducted in the coastal area of Vietnam as shown in Fig. 1. The design of the rigid sorting grid installed in the trawl net used for this experiment is shown in Fig. 2. The rigid sorting grid with bar spacing of 2 cm, 3 cm and 3 cm were used in this experiment. Fishing trials and data collection were carried out during daytime, and the performance of the rigid sorting grid with different bar spacing was investigated. A cover net was placed on the trawl net to collect escaped fish from the rigid sorting grid (Fig. 2 a). Total number of fishing operations were 14, being 7 each for bar spaces of 2 cm, 3 cm and 4 cm, respectively. The catch composition, weight and number of fish caught from each operation taken from the cover net and the codend were analyzed. Escaped fish from the trawl net collected in the cover net were calculated as:

$$\text{Escape (\%)} = W_{\text{cover net}} \text{ X } 100/ (W_{\text{codend}} + W_{\text{cover net}}) \quad \ldots(1)$$

Where $W_{\text{cover net}}$ is the caught weight (g) in the cover net and W_{codend} is the caught weight in the codend.

Results and Discussion

Catch weight and escaped fish from a trawl net with a rigid sorting grid installed

Table 1 shows the weight and percentage of escaped pelagic fish, demersal fish, miscellaneous species and trash fish caught by trawl nets with different bar spaces in rigid sorting grids, these data are plotted in Fig. 3. The results indicate that percentage of escape was in the range from 10-40% using the rigid sorting grid. The highest escape was observed for pelagic fish (22-40%), followed by demersal fish (10-17%), trash fish (12-28%) and miscellaneous species (about 10%). It is clearly seen from these results that pelagic fish could be easily released from the trawl nets with different bar spaces of the rigid sorting grid. As the rigid sorting grid is placed in the upper part of the net, it can be considered that this kind of JTEDs should have higher separating efficiency for fish swimming higher from the sea bottom. It can be observed that there was no significant difference in percentage of escape among trash fish, demersal fish and miscellaneous species. From these experimental results, it can be seen that there is no significant difference in escape as compared between different bar spaces of the rigid sorting grid.

Comparison of escape among different type of JTEDs

In the previous experiments on JTEDs, the results showed that the percentage of escape was 5-20% and 8-10% for the rectangular shaped and semi-curved JTEDs. In this experiment, it was from 10-40% as already mentioned. It can be observed that the percentage of escape was slightly higher with the wider spaced rigid sorting grid as compared to the other types. It can be considered that fish could escape both in the vertical and horizontal plane for the rigid sorting grid, whereas it could escape only in the vertical plane for the rectangular and semi-curve JTEDs. For this reason, it can be concluded that the rigid sorting grid may have a higher separating performance than those of the rectangular shape and semi-curve JTEDs.

Relationship between length and percentage of escape with different bar spaces in the rigid sorting grid

The relationship between length and percentage of escape for *Saurida undosquamis* is shown in Fig. 4. And the length of *Saurida undosquamis* collected in this area was in the range of 10-20 cm (length of the juvenile fish refers generally to less than 13 cm). The escape percentage was 10-25% for 4 cm bar spacing, about 25% for 3 cm, and about 50% for 2 cm bar spacing in the rigid sorting grid. It can be said that the separating performance of this type of JTEDs is about 25% for this type of fish and there was no difference in separating performances of the rigid sorting grids with bar spaces between 2cm to 3 cm.

The data for *Loligo sp.* caught in trawl net using the rigid sorting grid are shown in Figs. 5 and 6. It can be observed that the length of *Loligo sp.* caught in this experiment was comparatively higher than that of *Saurid undosqumis*, and was mostly from 20 cm to 100 cm. It can be seen that the percentage of escape was about 25-50% for all bar spacing. Similarly to that of the data for *Saurida undosquamis*, the results confirmed that there was no significant difference in the separating performance of rigid sorting grids with 2 cm to 3 cm bar spacing.

References

Bundit Chokesanguan, Suppachai Ananponsuk, Somboon Siriraksophon and Idrish Abdul Hamad, 2001. Study on Juvenile and Trash Excluder Devices (JTEDs) in Brunei Darussalam. 2001. SEAFDEC/TD.

Bundit Chokesanguan, Suppachai Ananponsuk, Somboon Siriraksophon and Lertchai Podapol, 2000. Study on Juvenile and Trash Excluder Devices (JTEDs) in Thailand. SEAFDEC/TD.

Table 1. Catch weight (g) and percentage of escape for different bar space of rigid sorting grid JTEDs.

Bar space	Pelagic fish			Demersal fish			Pelagic fish			Demersal fish		
	codend	cover net	codend	cover net	escape %	codend	cover net	escape %	escape %	codend	cover net	escape %
2cm	2035	570	16675	1695	9	13110	5146	28	22	12300	2522	17
3cm	1550	525	16072	1776	10	13250	1776	12	25	7414	832	10
3cm	1395	925	17535	1935	10	16780	2905	15	40	7527	1180	14

Escape (%) = $W_{cover\ net}$ X 100/ (W_{codend} + $W_{cover\ net}$)

Where $W_{cover\ net}$ = caught weight (g) in cover net

$W_{cover\ net}$ = caught weight (g) in codend

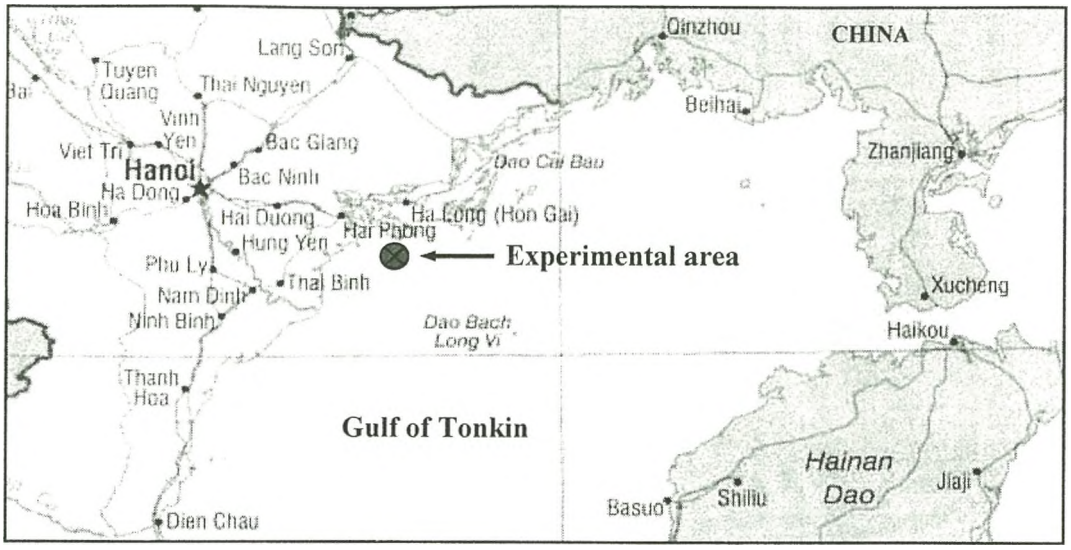
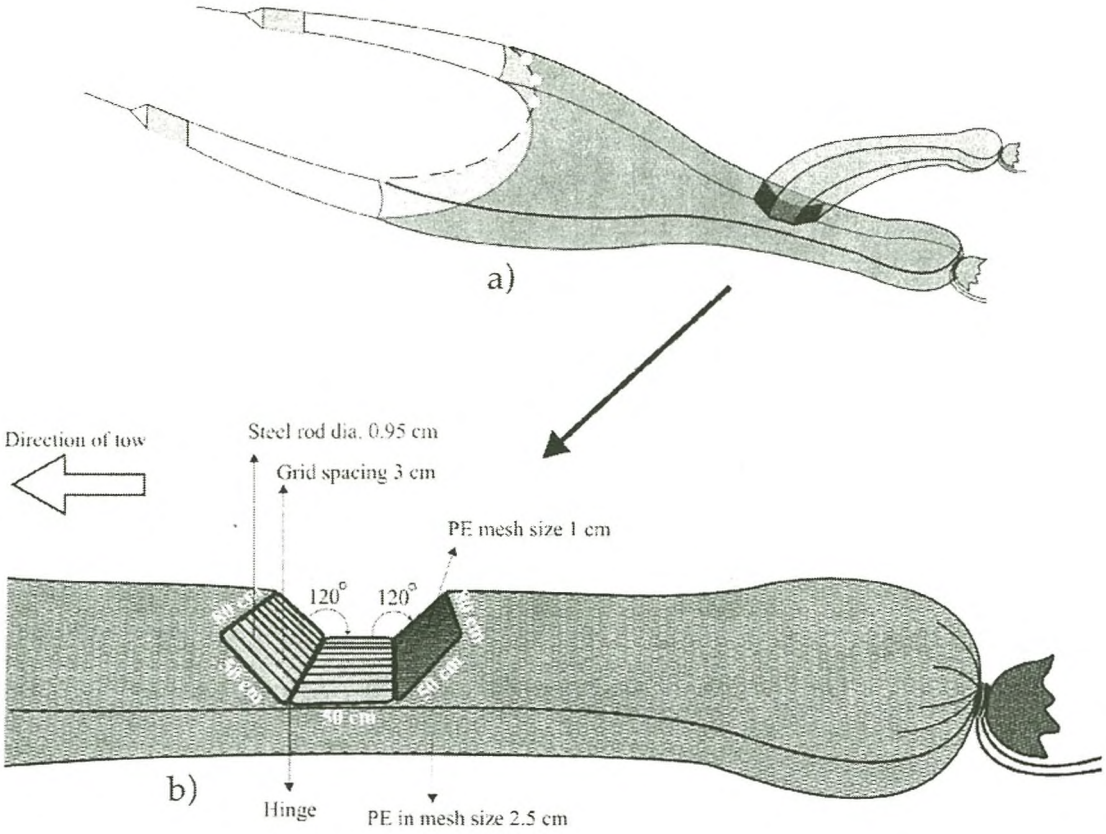


Fig. 1. The location of the study site for rigid sorting grid JTEDs in the Gulf Tokin, Vietnam



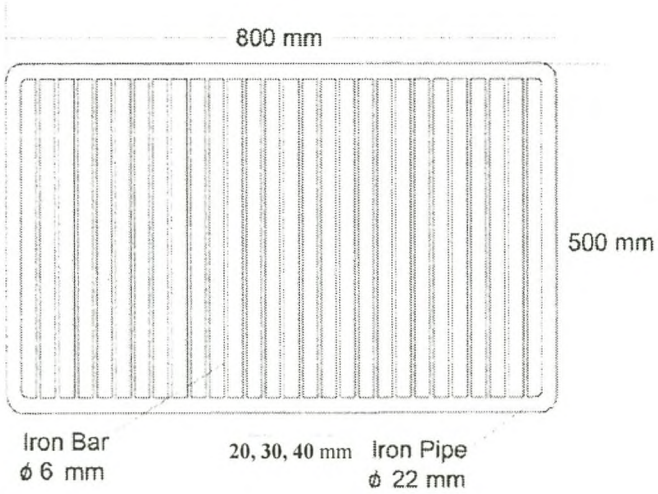


Fig. 2. Schematic diagram of the rigid sorting grid JTEDs used in this experiment.

a) and b) Installation of the rigid sorting grid on the trawl net.

c) Schematic diagram of the rigid sorting grid

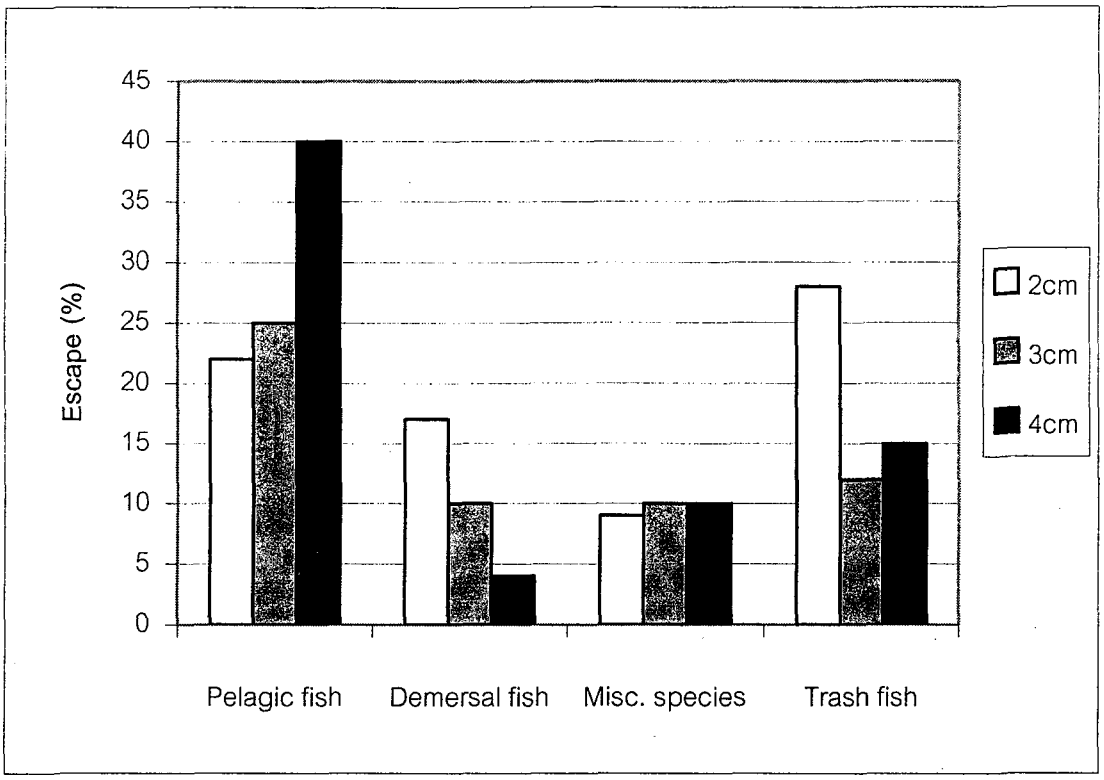


Fig. 3. Percentage of escaped fish from trawl net attached with rigid sorting grid JTEDs bar space 2 cm, 3 cm and 4 cm collected by using cover net.

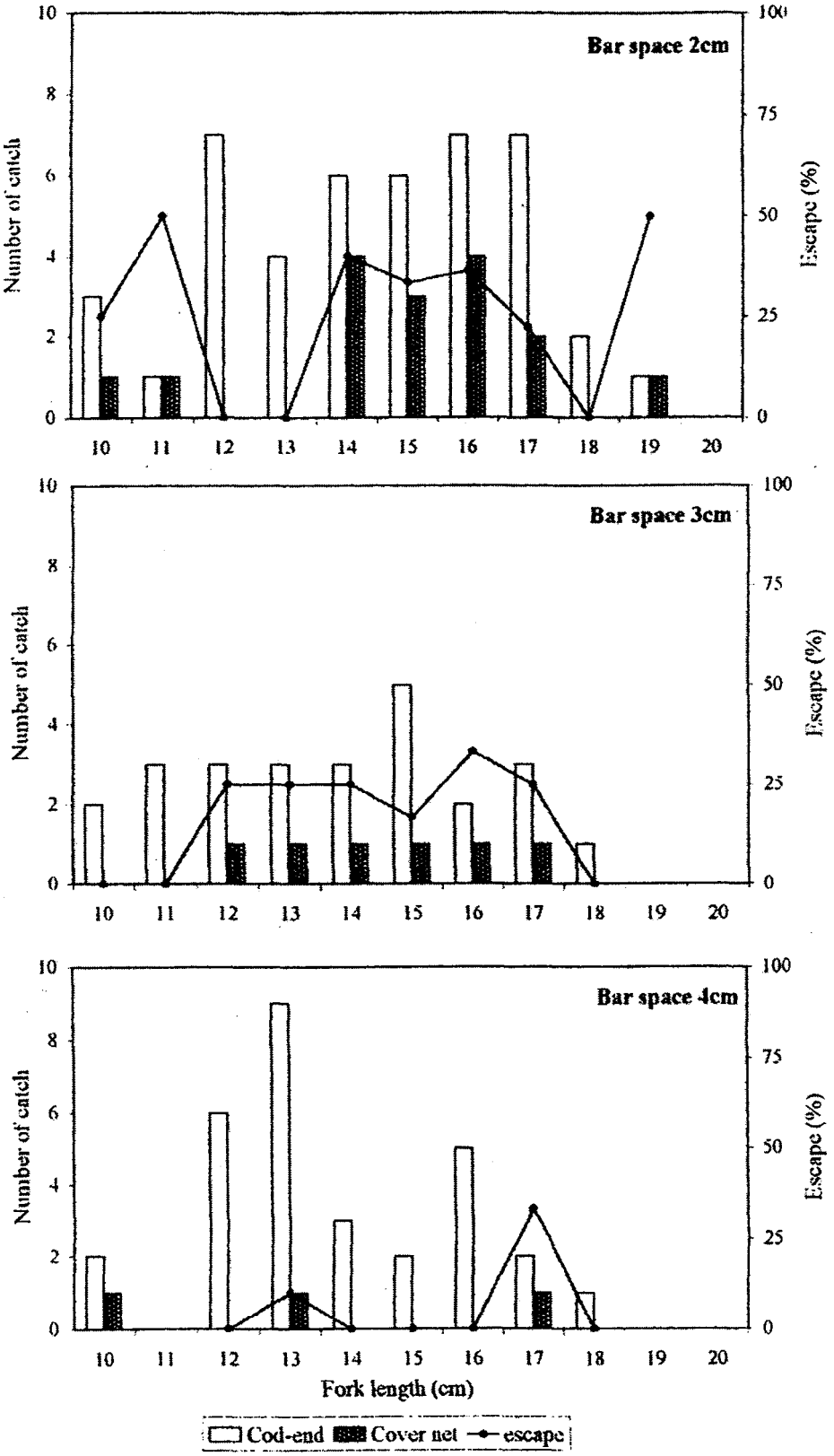


Fig. 4. Length of *Saurida undosquamis* caught in codend and cover net, and percentage of escape of JTEDs with different bar space.

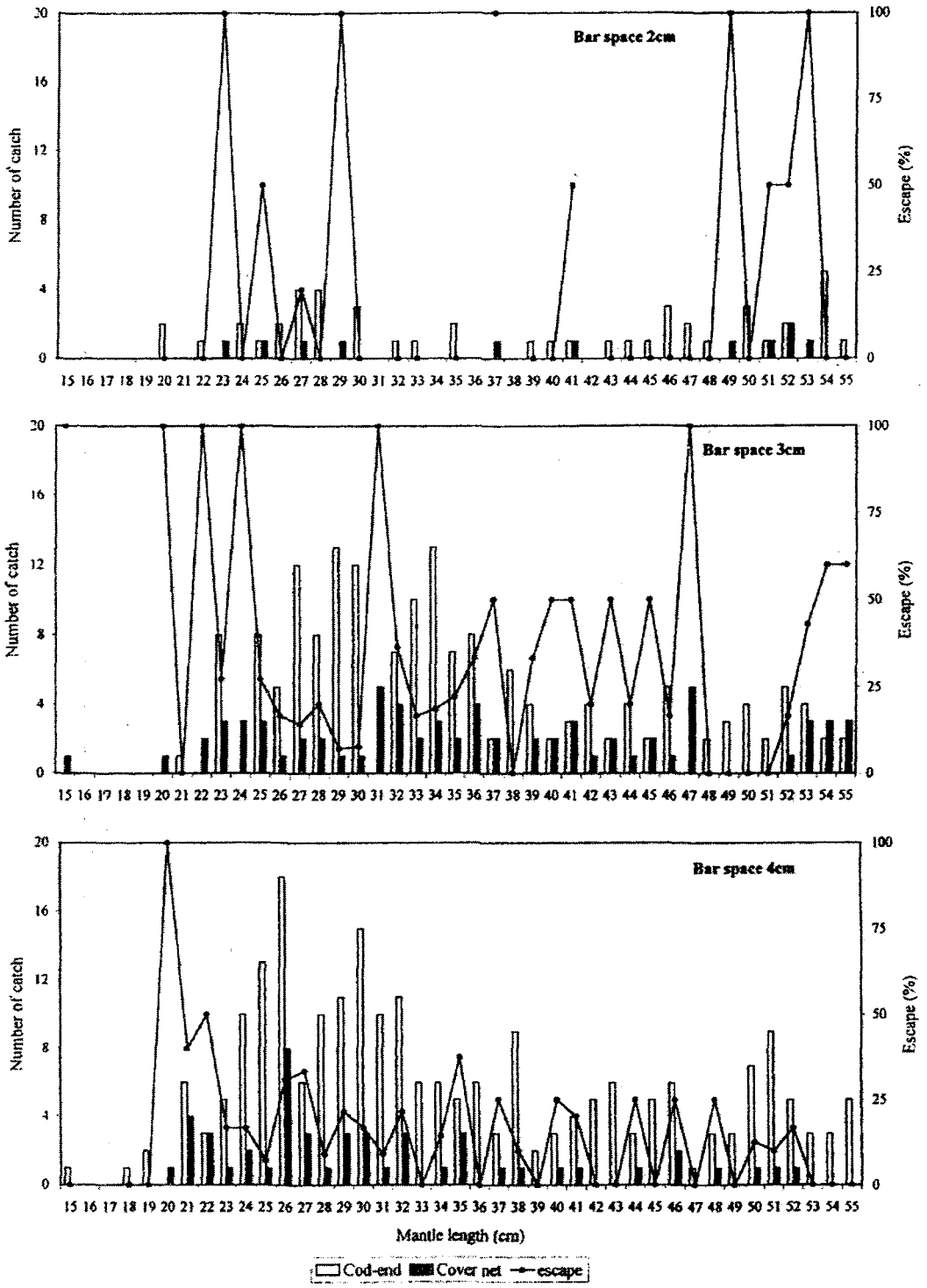


Fig. 5. Length of *Loligo* sp. (size 15 to 53 cm) caught in codend and cover net, and percentage of escape of JTEDs with different bar space.

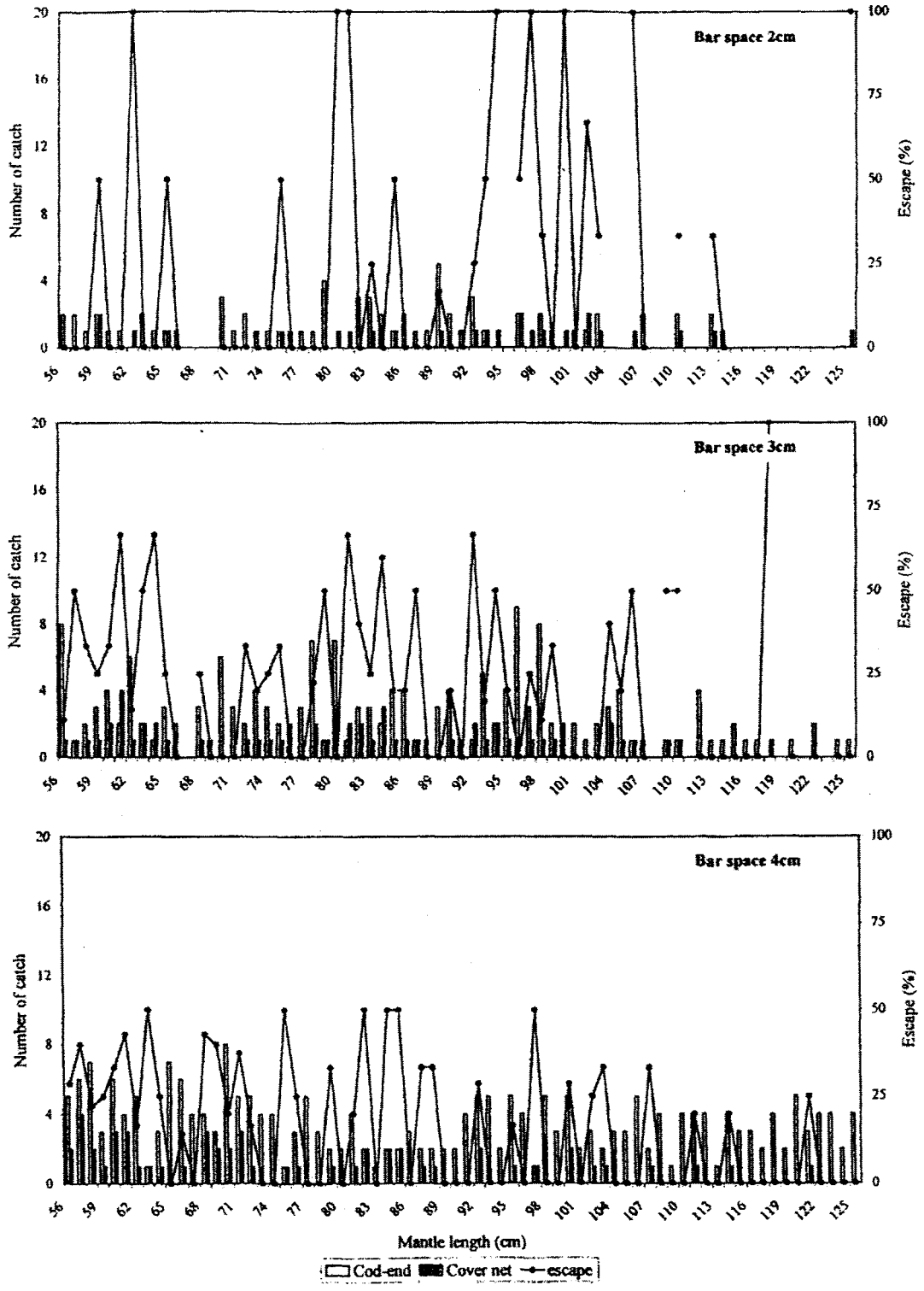


Fig. 6. Length of *Loligo* sp. (size 56 to 123 cm) caught in codend and cover net, and percentage of escape of JTEDs with different bar space.

Appendix 1. Summary of data collected from the Gulf of Tokin, Vietnam, using bottom trawl net attached with rigid sorting grid JTEDs bar space 2 cm.

Operation No.	1	2	3	4	5	6	7	8	9	10	11
Towing position											
Start towing											
Lat.	20"36'.46	20"36'.79	20"35'.12	20"37'.17	20"37'.11	20"30'.89	20"36'.68	20"34'.45	20"33'.29	20"32'.17	20"34'.20
Long.	107"01'.86	107"01'.95	107"02'.65	107"02'.18	107"01'.35	107"00'.99	107"02'.51	107"02'.65	107"33'.58	107"04'.13	107"03'.04
Finish towing											
Lat.	20"36'.74	20"35'.02	20"37'.08	20"38'.07	20"37'.94	20"36'.79	20"34'.90	20"33'.28	20"32'.02	20"34'.15	20"36'.09
Long.	107"01'.83	107"02'.69	107"02'.30	107"01'.44	107"01'.29	106"59'.81	107"02'.56	107"03'.43	107"04.44	107"33'.51	107"02'.84
Towing time	0900-1000	1012-1112	1126-1226	1247-1347	14058-1550	1520-1620	0920-1020	1035-1135	1152-1252	1327-1427	1445-1545
Towing speed (kt)	1.8	1.8	2.0	1.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Towing course	185	150	360	340	195	228	120	115	130	345	350
Water depth (m)	19	20	20	18	18	18	23	25	25	25	23
Catch in codend (g)											
Pelagic fish	410	225	30	70	160	360	475	55	125	35	90
Demersal fish	440	1080	1015	485	630	355	1080	850	1060	1510	3795
Miscellaneous species	1235	1510	1280	430	745	1045	1120	2295	3085	2105	1825
Trash fish	1230	1405	485	265	715	1740	1210	2285	1075	1410	1290
Sub-total	*3315*	*4220*	*2810*	*1250*	*2250*	*350*	*3885*	*3200*	*5345*	*5060*	*795*
Catch in cover net (g)											
Pelagic fish	175	5	5	10	60	20	110	45	45	10	90
Demersal fish	72	105	645	193	140	65	70	65	72	65	1030
Miscellaneous species	14	16	250	260	80	25	80	60	50	850	10
Trash fish	440	510	1210	80	206	640	180	460	220	720	480
Sub-total	*701*	*636*	*1210*	*543*	*486*	*750*	*440*	*630*	*387*	*795*	*1610*
Total catch (g)	4016	4856	4020	1793	2736	4250	4325	3830	5732	5855	2405

Appendix 2. Summary of data collected from the Gulf of Tokin, Vietnam, using bottom trawl net attached with rigid sorting grid JTEDs bar space 3 cm.

Operation No.	1	2	3	4	5	6	7
Towing position							
Start towing							
Lat.	20″37′.22	20″35′.36	20″33′.44	20″31′.79	20″33′.85	20″36′.00	20″37.93
Long.	107″02′.46	107″02′.61	107″02′.97	107″03′.53	107″03′.71	107″03′.49	107″02′.54
Finish towing							
Lat.	20″36′.74	20″35′.02	20″37′.08	20″38′.07	20″37′.94	20″36′.79	20″34′.90
Long.	107″02′.60	107″03′.71	107″03′.06	107″03′.72	107″03′.43	107″02′.50	107″02′.29
Towing time	0905-1005	1021-1121	1155-1255	1310-1410	1424-1524	1535-1635	1648-1748
Towing speed (kt)	1.9	1.8	1.9	1.8	2.1	2.1	1.8
Towing course	170	180	160	10	5	355	355
Water depth (m)	24	24	24	23	24	20	20
Catch in codend (g)							
Pelagic fish	140	955	70	95	145	100	45
Demersal fish	705	220	1335	1764	2265	665	460
Miscellaneous species	1070	867	5005	5060	2170	1510	390
Trash fish	1830	1625	3850	2210	2040	1215	480
Sub-total	*3745*	*3667*	*10260*	*9129*	*6620*	*3490*	
Catch in cover net (g)							
Pelagic fish	50	215	100	20	45	95	0
Demersal fish	170	15	85	225	142	130	65
Miscellaneous species	221	150	550	265	400	10	180
Trash fish	460	240	820	260	430	150	200
Sub-total	*901*	*620*	*1555*	*770*	*1017*	*385*	*445*
Total catch (g)	4646	4287	11815	9899	7637	3875	445

Appendix 3. Summary of data collected from the Gulf of Tokin, Vietnam, using bottom trawl net attached with rigid sorting grid JTEDs bar space 4 cm.

Operation No.	1	2	3	4	5	6	7
Towing position							
Start towing							
Lat.	20"37'.83	20"35'.39	20"33'.58	20"31'.77	20"33'.46	20"35'.34	20"37'.13
Long.	107"03'.95	107"03'.31	107"03'.98	107"03'.97	107"02'.54	107"02'.44	107"01'.78
Finish towing							
Lat.	20"35'.74	20"33'.57	20"31'.63	20"33'.49	20"35'.42	20"36'.44	20"38'.97
Long.	107"03'.11	107"03'.31	107"03'.96	107"02'.93	107"02'.54	107"02'.45	107"02'.05
Towing time	0857-0957	1120-1220	1233-1333	1347-1447	1508-1608	1620-1720	1720-1820
Towing speed (kt)	2.0	1.8	1.9	1.9	2.0	2.1	2.0
Towing course	120	150	175	350	355	330	10
Water depth (m)	21	21	23	23	21	20	20
Catch in codend (g)							
Pelagic fish	140	445	245	155	40	165	205
Demersal fish	1255	820	1135	1485	435	1555	842
Miscellaneous species	1605	1520	4600	3295	2115	3560	840
Trash fish	950	2425	5675	1530	1025	1885	3290
Sub-total	*3950*	*5210*	*1165*	*6465*	*3615*	*7165*	*5177*
Catch in cover net (g)							
Pelagic fish	35	80	185	120	400	15	90
Demersal fish	550	115	95	235	85	75	25
Miscellaneous species	130	190	485	510	285	265	70
Trash fish	270	440	1140	220	175	230	430
Sub-total	*985*	*825*	*1905*	*1085*	*945*	*585*	*615*
Total catch (g)	4935	6035	13560	7550	4560	7750	5792

Appendix 4. Specific name and weight of pelagic fish caught by trawl net attached with rigid sorting grid JTEDs of 2 cm, 3 cm and 4 cm grid space.

(unit : gram)

No.	Name	Grid space								
		2 cm			3 cm			4 cm		
		codend	cover net	% of escape	codend	cover net	% of escape	codend	cover net	% of escape
1	*Thryssa mystax*	95	0	0	30	0	0	70	45	39
2	*Ilisha elaongata*	380	160	30						
3	*Stolephorus indicus*	155	165	52	205	275	57	290	300	51
4	*Selaroides leptolepis*	205	60	23	345	45	12	315	0	0
5	*Decapterus maruadsi*	760	165	18	505	160	24	400	540	57
6	*Ilisha elongata*	90	10	10				20	40	67
7	*Formio niger*	20	0	0	0	45	100	40	0	0
8	*Caranx mate*	10	0	0						
9	*Thryssa hamiltoni*	105	0	0	45	0	0			
10	*Pampus argenteus*	155	0	0	70	0	0			
11	*Dussumieria acuta*	20	10	33	55	0	0	150	0	0
12	*Sardinella jussien*	25	1	0				25	0	0
13	*Synodus variegatus*	15	0	0	55	0	0	25	0	0
14	*Atropus* sp.				240	0	0			
15	*Alepes ciliaris*							60	0	0
		2035	570	22	1550	525	25	1395	925	40

Appendix 5. Specific name and weight of demersal fish caught by trawl net attached with rigid sorting grid JTEDs of 2 cm, 3 cm and 4 cm grid space.

(unit : gram)

No.	Name	Grid space								
		2 cm			3 cm			4 cm		
		codend	cover net	% of escape	codend	cover net	% of escape	codend	cover net	% of escape
1	*Pennahia agentatus*	60	0	0						
2	*Saurida undosquamis*	1920	675	26	610	170	22	902	80	8
3	*Trichiurus haumela*	245	195	44	210	35	14	330	70	18
4	*Evynnis cardinalis*	1650	126	7	1585	150	9	1800	190	10
5	*Upeneus sulphureus*	450	111	20	35	55	61	175	20	10
6	*Platycephalus* sp.	40	0	0						
7	*Siganus canaliculatus*	3550	990	22	2310	285	11	1470	475	24
8	*Nermipterus mesoprion*	320	55	15	165	60	27	50	50	50
9	*Cynogrossus* sp.	835	135	14	319	30	9	380	30	7
10	*Ariomma indica*	30	25	45						
11	*Siganus oramin*	990	178	15						
12	*Johnius belengerii*	385	15	4	450	20	4	335	70	17
13	*Sphyraena jello*	5	0	0				580	0	0
14	*Sphyraena barracuda*	340	0	0	150	0	0			
15	*Branchiostegus japonicus*	395	0	0				195	0	0
16	*Sclopsis taeniopterus*	840	0	0	1080	0	0	460	0	0
17	*Pseudorhombus* sp.	70	11	14	65	10	13	15	10	40
18	*Epinephelus sexfasciatus*	10	0	0				150	0	0
19	*Platycephalus* sp.	165	6	4	35	2	5	125	30	19
20	*Nemipterus japonicus*				45	0	0	0	50	100
21	*Saurida tunbil*				300	0	0			
22	*Nemipterus peronii*				30	0	0			
23	*Priacathus tayenus*				0	5	100	0	30	100
24	*Muraenesox cinereus*				0	10	100			
25	*Gerrus filamentosus*				25	0	0			
26	*Scianenidae*							200	15	7
27	*Otolithes ruber*							90	0	0
28	*Pomadasys hasta*							145	0	0
29	*U. maluensis*							20	0	0
30	*Lepidotrigla alata*							10	0	0
31	*Nannostomus marginatus*							70	60	46
32	*Xyrichtys verrens*							25	0	0
	Sub-total	12300	2522	17	7414	832	10	7527	1180	14

Appendix 6. Specific name and weight of miscellaneous species caught by trawl net attached with rigid sorting grid JTEDs of 2 cm, 3 cm and 4 cm grid space.

(unit : gram)

No.	Name	Grid space								
		2 cm			3 cm			4 cm		
		codend	cover net	% of escape	codend	cover net	% of escape	codend	cover net	% of escape
1	*Loligo duvaucelii*	6810	1350	17	7170	1505	17	9275	1425	13
2	*Sepia pharanis*	820	0	0						
3	*Euprynna morsei*	60	0	0	5	5	50	15	10	40
4	*Sepia* sp.	760	0	0	640	0	0	385	0	0
5	*Octopus* spp.				350	0	0			
1	*Penaeus merguiensis*	595	50	8	220	55	20			
2	*Parapenaeopsis tenella*	1655	145	8	1015	86	8	1305	60	4
3	*Trachypenaeus*	10	0	0						
4	*Matapenaeus intermedious*	40	0	0	25	0	0			
5	*Penaeus monodon*	30	0	0				500	0	0
6	*Metapenaeus affinis*							210	0	0
7	Mixed shrimp							590	20	3
8	*Solenocera* spp.							5	0	0
1	*Portunus* sp.	750	10	1	60	50	45			
2	Miscellaneous crabs	4300	120	3	6450	70	1	5250	420	7
1	*A. pleuronectes*	10	0	0						
2	Miscellaneous shells	130	0	0						
3	Flathead lobster	245	10	4						
4	Mantis shrimp	460	10	2	137	5	4			
	Sub-total	16675	1695	9	16072	1776	10	17535	1935	10

Appendix 7. Specific name and weight of miscellaneous species caught by trawl net attached with rigid sorting grid JTEDs of 2 cm, 3 cm and 4 cm grid space.

(unit : gram)

No.	Name	Grid space								
		2 cm			3 cm			4 cm		
		codend	cover net	% of escape	codend	cover net	% of escape	codend	cover net	% of escape
1	*Apogonidae*	420	30	7	140	0	0	310	60	16
2	*Leiognathidae*	12180	4150	25	12950	2620	17	15520	2810	15
3	*Theraponidae*	75	0	0	60	0	0			
4	*Lagocephalus wheeleri*	435	965	69	90	15	14	70	35	33
5	*P. Polynema*	0	1	100	10	0	0	10	0	0
6	*L. sceleratus*							870	0	0
	Sub-total	13110	5146	28	13250	2635	17	16780	2905	15

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