

Surat Thani Blue Swimming Crab Fishery Improvement Project

Milestone 33b: Final report of bycatch research

Progress report: The study of fishery biology, socio-economic and ecosystem related to the restoration of Blue Swimming Crab following Fishery improvement program (FIP) in Bandon Bay, Surat Thani province.

Amornsak Sawusdee¹

⁽¹⁾ The Center of Academic Service, Walailak University, Tha Sala, Nakhon Si Thammarat, 80160

The results of observation of catching BSC by using collapsible crab trap and floating seine.

According to the observation of aquatic animal which has been caught by main BSC fishing gears; floating seine and collapsible crab trap, there were 176 kind of aquatic animals. The catch aquatic animals are shown in the table1. In this study, aquatic animal was classified into 11 Groups; Blue Swimming Crab (*Portunus Pelagicus*), Coelenterata (coral animals, true jellies, sea anemones, sea pens), Helcionelloida (clam, bivalve, gastropod), Cephalopoda (squid, octopus), Chelicerata (horseshoe crab), Hoplocari(stomatopods), Decapod (shrimp), Anomura (hermit crab), Brachyura (crab), Echinoderm (sea cucumbers, sea stars, sea urchins), Vertebrata (fish). Vertebrata was the main group that was captured by BSC fishing gears, more than 70 species. Next are Helcionelloida and Helcionelloida 38 species and 29 species respectively. The sample that has been classified were photographed and attached in appendix 1. However, some species were classified as unknow which are under the classification process and reconcile.

There were 89 species that were captured by floating seine. The 3 main group that were captured by this fishing gear are Vertebrata (34 species), Brachyura (20 species) Helcionelloida and Echinoderm (10 Species). On the other hand, there were 129 species that were captured by collapsible crab trap. The 3 main group that were captured by this fishing gear are Vertebrata (47 species), Brachyura (32 species) Helcionelloida (18 Species).

Table 1 Classification of captured aquatic animal using_floating seine and collapsible crab trap.

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
1	Actiniaria	Diadumenidae	<i>Sea animone</i>	Sea anemone	x	x	x	x
2	Heterostropha	Architectonicidae	<i>Architectonica perdix</i>	partridge sundial	x			
3			<i>Architectonica perspectiva</i>	clear sundial	x			
4	Littorinimorpha	Strombidae	<i>Laevistrombus canarium</i>	dog conch, wing shell	x	x		x

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
5			<i>Doxander vittatus</i>	Conch Shells	x			
6		Bursidae	<i>Bufo naria crumena</i>	Crumena bunker	x	x	x	x
7		Naticidae	<i>Natica vitellus</i>	Calf Moon	x	x		x
8		Personidae	<i>Distorsio reticularis</i>	Reticulate distorsio	x	x		
9		Ranellidae	<i>Gyrineum bituberculare</i>	Triton snails	x	x		
10	Neogastropoda	Muricidae	<i>Indothais sp.</i>	Carinate rock shell	x		x	x
11			<i>Lataxiena blosvillei</i>	Muricidae	x			
12			<i>Murex trapa</i>	Rare-spined murex	x			x
13			<i>Murex sp.</i>	Stout-spine murex	x	x	x	x
14			Muricidae	Muricidae	x		x	x
15			<i>Rapana rapiformis</i>	Turnish shaped rapa				
16		Melongenidae	<i>Hemifusus sp.</i>	Spiral melongena	x		x	x
17			<i>Pugilina Schumacher</i>	Spiral melongena			x	x
18		Buccinidae	<i>Nassaria pusilla</i>	White Phos	x			
19		Fascioliariidae	<i>Pleuroploca sp.</i>	-	x			
20		Nassariidae	<i>Nassarius siquijorensis</i>	Burned nassa	x	x		x
21		Volutidae	<i>Cymbiola nobilis</i>	noble volute	x		x	
22			<i>Melo melo</i>	Indian volute			x	x
23	Arcida	Arcidae	<i>Anadara inaequalvis</i>	Barbatia ark clam	x	x	x	x
24			<i>Tegillarca nodifera</i>	Nodular ark	x			
25			<i>Trisidos semitorta</i>	Propellor ark	x	x		
26	Mytilida	Mytilidae	<i>Modiolus proclivis</i>	horse mussel	x	x		
27	Pterioida	Pteriidae	<i>Pinctada sp.</i>	Gulf pearl oyste		x		
28		Veneridae	<i>Placamen sp.</i>	-		x		
29	Ostreoida	Pectinidae	<i>Mimachlamys sp.</i>	variegated scallop	x	x		
30	Venerida	Veneridae	<i>Paphia undulata</i>	Clams	x	x		x

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
31	Sepiida	Sepiidae	<i>Sepia</i> sp.1	squid	x		x	x
32			<i>Sepia</i> sp.2	squid	x	x		x
33			<i>Sepiella inermis</i>	spineless cuttlefish	x			
34	Octopoda	Octopodidae	<i>Octopus</i> sp.	Octopus	x		x	x
35	Xiphosura	Limulidae	<i>Tachypleus gigas</i>	Pimp dish	x		x	x
36	Stomatopoda	Squillidae	<i>Harpiosquilla harpax</i>	Robber harpiosquillid mantis shrimp	x	x	x	x
37			<i>Harpiosquilla raphidea</i>	Giant harpiosquillid mantis shrimp	x			x
38			<i>Oratosquilla interrupta</i>	Mantis shrimp	x	x	x	x
39			<i>Oratosquilla woodmasoni</i>	<i>Oratosquilla woodmasoni</i>	x			
40			<i>Oratosquilla nepa</i>	Mantis shrimp	x			x
41	Decapoda	Palaemonidae	<i>Macrobrachium rosenbergii</i>	Giant malaysian prawn	x		x	x
42		Penaeidae	<i>Metapenaeus</i> sp.	prawn	x	x	x	x
43			<i>Penaeus semisulcatus</i>	Green tiger prawn	x	x	x	x
44			<i>Penaeus silasi</i>	False white prawn	x	x		x
45		Diogenidae	<i>Diogenes</i> sp.	Hermit crab	x		x	x
46			<i>Diogenes</i> sp.	Hermit crab	x			x
47			<i>Clibanarius infraspinatus</i>	Hermit crab	x	x	x	x
48			<i>Dardanus lagopodes</i>	hairy red hermit crab	x	x		x
49		Calappidae	<i>Calappa clypeata</i>	Box crab	x			x
50		Dorippidae	<i>Dorippe quadridens</i>	Sumo crab	x	x	x	x
51			<i>Neodorippe callida</i>	leaf-porter crab	x			
52		Epialtidae	<i>Doclea armata</i>	Spider crab	x	x	x	x
53			<i>Doclea canalifera</i>	Spider crab	x	x	x	x
54	Decapoda		<i>Doclea rissoni</i>	Spider crab	x			
55			<i>Doclea</i> sp.	Spider crab	x	x	x	x

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
56		Galenidae	<i>Galene bispinosa</i>	square-shelled crab		x	x	x
57			<i>Halimede ochtodes</i>		x		x	x
58			<i>Hippocampus</i> sp.		x			
59		Leucosiidae	<i>Arcania heptacantha</i>	Pebble crab	x	x	x	x
60			<i>Seulocia vittata</i>	Pebble crab	x	x		
61		Iphiculidae	<i>Pariphiculus mariannae</i>	Pebble crab	x	x	x	x
62		Menippidae	<i>Myomenippe hardwickii</i>	Thunder crab	x		x	
63			<i>Matuta planipes</i>	Flower moon crab	x		x	x
64			<i>Matuta victor</i>	Common moon crab			x	x
65		Macrophthalmidae	<i>Macrophthalmus</i> sp.	Sentinel crab	x	x		
66		Parthenopidae	<i>Cryptopodia fornicata</i>	Domed elbow crab			x	
67			<i>Enoplolambrus</i> sp.	Elbow crab	x	x		x
68			<i>Rhinolambrus</i> sp.	crab	x	x	x	x
69		Portunidae	<i>Charybdis affinis</i>	Smoothshelled swimming crab	x	x	x	x
70			<i>Charybdis anisodon</i>	twospined arm swimming crab	x	x	x	x
71			<i>Charybdis feriata</i>	Crucifix crab		x	x	
72			<i>Charybdis natator</i>	ridged swimming crab	x	x		
73			<i>Charybdis truncata</i>	blunt-toothed crab	x	x		
74			<i>Lupocycloporus gracilimanus</i>	crab	x	x		
75			<i>Portunus haanii</i>	red swimming crab		x	x	x
76			<i>Podophthalmus vigil</i>	Sentinel crab	x	x	x	x
77			<i>Portunus pelagicus</i>	Blue swimming crab	x	x	x	x
78			<i>Portunus sanguinolentus</i>	Three-spot swimming crab	x			
79			<i>Scylla olivacea</i>	Mud crab	x			
80			<i>Thalamita crenata</i>	wide front swimcrab	x	x		

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
81	Decapoda		<i>Thalamita sima</i>	four-lobed swimming crab	x			
82			<i>Thalamita spinimana</i>	Spiny swimming crab		x		
83			<i>Xiphonectes hastatoides</i>					
84		Goneplacidae	<i>Scalopidia spinosipes</i>	-		x		
85		Xanthidae	<i>Demania scaberrima</i>	Round crab	x		x	
86		Grapsidae	<i>Varuna yui</i>	Sundaic paddler crab	x	x		x
87	Ophiurida	Ophiotrichidae	<i>Ophiocnemis marmorata</i>	Marbled brittle star	x			
88			<i>Ophiocnemis sp.</i>	Marbled brittle star	x			
89	Paxillosida	Luidiidae	<i>Luidia sp.</i>	Sea star	x			
90			Sea Star1	Sea star	x		x	
91			Sea star2	Sea star	x			
92			Sea star3	Sea star	x	x	x	x
93	Temnopleuridae	Temnopleuridae	<i>Temnopleurus toreumaticus</i>	striped spine sea urchin	x	x		
94	Clypeasteroidea	Arachnoididae	<i>Arachnoides placenta</i>	Cake sand dollar	x	x	x	x
95	Molpadida	Caudinidae	<i>Acaudina sp.1</i>	sea cucumber	x	x	x	x
96			<i>Acaudina sp.2</i>	sea cucumber	x	x	x	
97			Sea cucumber 1	sea cucumber	x			
98			Sea cucumber 2	sea cucumber				
99			Sea cucumber 3	sea cucumber	x		x	
100	Boletales	Boletaceae	<i>Phyllophorella kohkutiensis</i>	sea cucumber	x	x	x	x
101	Pennatulacea	Unknow family	Sea pen	Sea pens		x		x
102	Spatangoida	Schizasteridae	<i>Schizaster lacunosus</i>	lacunal sea potato			x	
103	Rajiformes	Dasyatidae	<i>Himantura imbricata</i>	Dwarf whipray			x	
104	Myliobatiformes		<i>Maculabatis gerrardi</i>	Sharpnose stingray	x			
105	Anguilliformes	Muraenesocidae	<i>Muraenesox bagio</i>	Common pike conger	x			x

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
106			<i>Muraenesox cinereus</i>	Daggertooth pike conger		x		
107		Muraenidae	<i>Gymnothorax sp.</i>	Common morays	x			x
108	Clupeiformes	Clupeidae	<i>Sardinella gibbosa</i>	Goldstripe sardinella				
109		Engraulidae	<i>Thryssa hamiltonii</i>	Hamilton's thryssa				
110			<i>Thryssa kammalensis</i>	Kammal thryssa			x	
111	Siluriformes	Ariidae	<i>Hexanematchthys sagor</i>	Sagor catfish				
112		Plotosidae	<i>Plotosus lineatus</i>	Striped eel catfish	x			
113	Batrachoidiformes	Batrachoididae	<i>Batrachomoeus trispinosus</i>	Freshwater lionfish, Three-spined frogfish	x			
114	Beloniformes	Belonidae	<i>Strongylura strongylura</i>	Black spot long tom				x
115	Lophiiformes	Antennariidae	<i>Antennatus nummifer</i>	Spotfin frogfish	x		x	x
116	Scorpaeniformes	Platycephalidae	<i>Platycephalus indicus</i>	Bartail flathead	x			
117		Tetrarogidae	<i>Vespacula trachinoides</i>	Goblinfish	x			x
118	Perciformes	Ambassidae	<i>Ambassis vachellii</i>	Vachelli's glass perchlet	x			
119		Apogonidae	<i>Ostorhinchus fasciatus</i>	Broadbanded cardinalfish	x			
120		Blenniidae	<i>Petroscirtes sp.</i>	Variable sabretooth blenny	x	x		
121		Gobiidae	<i>Acentrogobius caninus</i>	Tropical sand goby			x	
122		Gerreidae	<i>Gerres macracanthus</i>	Longspine silverbidy	x		x	
123		Carangidae	<i>Alepes djedaba</i>	Shrimp scad	x			
124			<i>Carangoides praeustus</i>	Brownback trevally	x			
125			<i>Carangoides sp.</i>	Kingfishs				x
126			<i>Megalaspis cordyla</i>	Torpedo scad			x	
127			<i>Pampus chinensis</i>	Chinese silver pomfret	x		x	
128		Leiognatidae	<i>Eubleekeria splendens</i>	Splendid ponyfish	x			
129			<i>Gazza minuta</i>	Toothpony	x			
130			<i>Nuchequula gerreoides</i>	Decorated ponyfish	x			x

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
131			<i>Secutor hanedai</i>	Haneda's ponyfish	x		x	x
132		Haemulidae	<i>Lutjanus russelli</i>	Russell's snapper	x			
133			<i>Pomadasys maculatus</i>	Saddle grunt	x			
134			<i>Pomadasys kaakan</i>	Javelin grunter	x			
135		Nemipteridae	<i>Nemipterus japonicus</i>	Japanese threadfin bream		x		
136			<i>Nemipterus sp.</i>	Ornate threadfin bream	x		x	
137	Perciformes	Priacanthidae	<i>Priacanthus tayenus</i>	Purple-spotted bigeye			x	
138		Polynemidae	<i>Eleutheronema tetradactylum</i>	Fourfinger threadfin		x		
139		Rachycentridae	<i>Rachycentron canadum</i>	Cobia	x	x	x	x
140		Scienidae	<i>Johnius amblycephalus</i>	Goatee croaker	x		x	
141		Scienidae	<i>Pseudosciaena soldado</i>	Caroun croaker	x		x	
142			<i>Otolithes ruber</i>	Tigertooth croaker	x			x
143			<i>Pennahia anea</i>	Donkey croaker	x		x	
144			<i>Panna microdon</i>	Panna croaker			x	x
145		Silaginidae	<i>Sillago sihama</i>	Silver sillago	x			
146		Mullidae	<i>Upeneus sulphureus</i>	Sulphur goatfish	x		x	
147			<i>Upeneus sundaicus</i>	Ochreband goatfish	x			
148		Drepaneidae	<i>Drepane punctata</i>		x	x		
149		Teraponidae	<i>Terapon jarbua</i>	Target fish	x		x	
150			<i>Terapon puta</i>	Small-scaled terapon	x	x		
151			<i>Terapon theraps</i>	Largescaled terapon	x		x	x
152		Ephippidae	<i>Ephippus orbit</i>	Orbfish	x			
153		Sphyracnidae	<i>Sphyracna jello</i>	Pickhandle barracuda	x			x
154		Scatophagidae	<i>Scatophagus argus</i>	Spotted scat		x		
155		Scombridae	<i>Rastrelliger kanagurta</i>	Indian mackerel	x			

No	Order	Family	Species	Common name	Fishing gears			
					Trap (boat size)		Gillnet (boat size)	
					<14 m	>14 m	<14 m	>14 m
156			<i>Scomberomorus commerson</i>	Narrow-barred Spanish mackerel	x			
157		Serranidae	<i>Epinephelus coioides</i>	Orange-spotted grouper	x	x		
158			<i>Epinephelus sexfasciatus</i>	Orange-spotted grouper	x			
159		Siganidae	<i>Siganus canaliculatus</i>	White-spotted	x		x	x
160		Leiognathidae	<i>Siganus javus</i>	Streaked spinefoot	x		x	x
161	Pleuronectiformes	Soleidae	<i>Brachirus orientalis</i>	Oriental sole	x		x	x
162			<i>Brachirus harmandi</i>	Sole	x		x	
163			<i>Synaptura commersonnii</i>	Commerson's sole	x			
164		Cynoglossidae	<i>Cynoglossus arel</i>	Largescale tonguesole	x		x	
165			<i>Cynoglossus trulla</i>	Macau sole	x	x	x	x
166			<i>Cynoglossus sp.</i>	Tongue sole	x			
167	Tetraodontiformes	Triacanthidae	<i>Triacanthus nieuhofii</i>	Silver tripodfish	x		x	
168		Monacanthidae	<i>Paramonacanthus choirocephalus</i>	Fan-bellied leatherjacket, Fan-bellied filefish	x	x		
169		Tetraodontidae	<i>Chelonodon sp.</i>	pufferfishes	x			
170			<i>Lagocephalus lunaris</i>	Green pufferfish, Ceylon puffer	x	x	x	x
171			<i>Takifugu oblongus</i>	Lattice blaasop	x		x	
172	unknow	unknow 1			x			
173		unknow 2			x			
174		unknow 3			x			
175		unknow 4			x			

When considering the capture proportion of aquatic animal using floating seine, classified by group, the result indicated that floating seine which mainly target BSC was able to catch BSC at 27.9% of overall captured aquatic animal. Helcionelloida and Echinoderm were 25.1% and 11.7% respectively. (Figure 1 and Table 2). However, in the aspect of weight, using floating seine could captured 55.3% of BSC, 18.4% of Brachyura and 9.3% of Vertebrata of total captured weight. (Figure 2 and Table 3)

The capture proportion of aquatic animal using collapsible crab trap, classified by group, the result indicated that collapsible crab trap could captured BSC which is the main target, at 12.3% of all capture aquatic animal, 49.3 for Brachyura and 12.2% for Vertebrata (Figure 3 and Table 4). Nevertheless, focusing on weight, the proportion of captured BSC is calculated as 32.2%, Brachyura is calculated as 37.7% and 16.8% for the Vertebrata.(Figure 4 and Table 5)

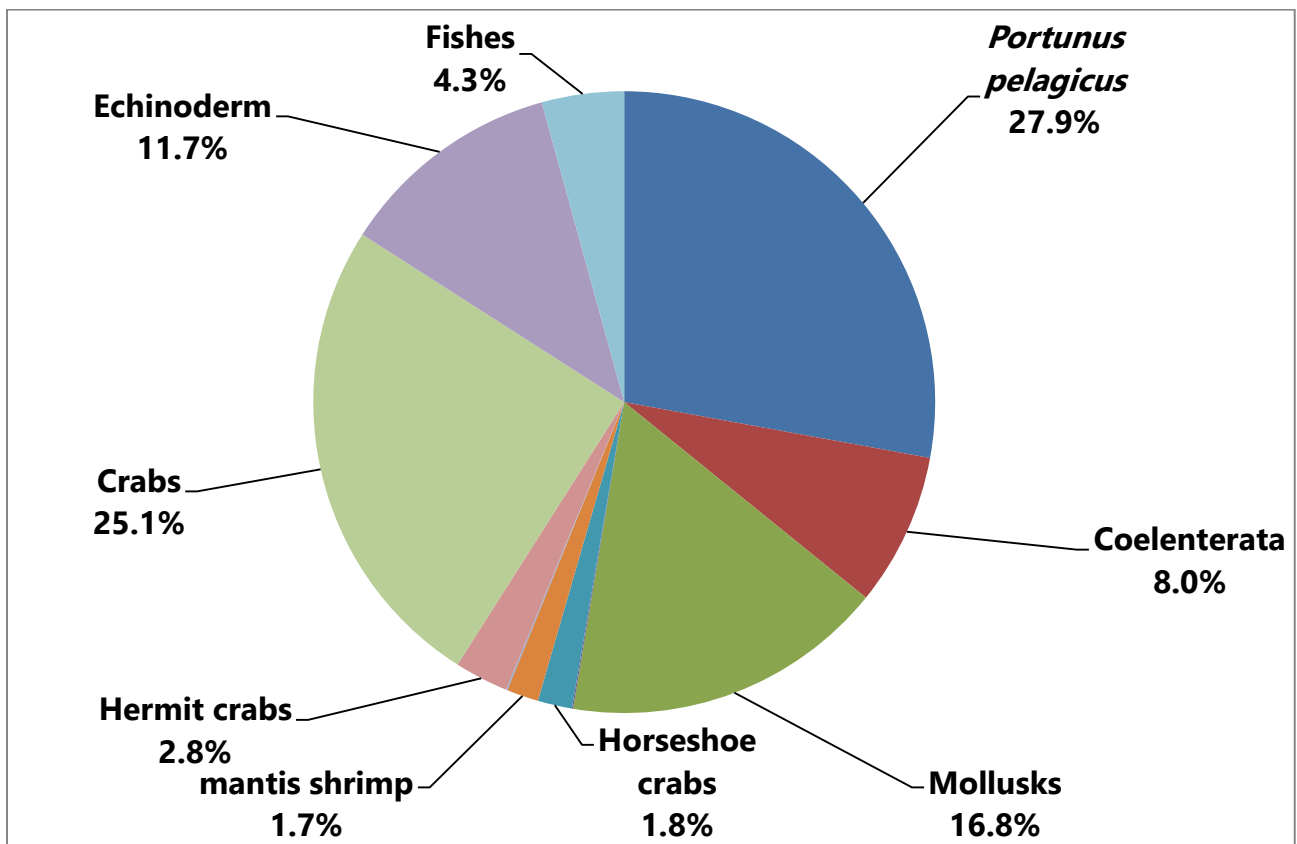


Figure 1 The proportion of captured aquatic animal using floating seine, classified by group and number of captured aquatic animal.

Table 2 The proportion of captured aquatic animal using floating seine, classified by group and number of captured aquatic animal.

Marine Animal Groups / Month	Oct/17 (%)	Nov/17 (%)	Dec/17 (%)	Jan/18 (%)	Feb/18 (%)	Mar/18 (%)	Apr/18 (%)	May/18 (%)
<i>Portunus pelagicus</i>	37.4	42.4	17.3	47.4	15.1	11.0	24.5	27.9
Coelenterata	0.0	5.2	40.5	0.0	5.3	3.1	1.6	8.0
Mollusks	2.3	6.4	10.9	33.3	11.2	17.8	35.8	16.8
Squids	0.1	0.0	0.0	0.0	0.0	0.1	0.3	0.1
Horseshoe crabs	0.0	2.5	1.9	5.1	0.0	0.3	2.6	1.8
Mantis shrimps	6.3	2.4	0.9	0.0	0.2	1.5	0.3	1.7
Shrimps	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.1
Hermit crabs	0.0	6.9	2.8	1.3	3.0	3.5	2.1	2.8
Crabs	34.5	25.4	13.7	9.0	43.4	38.9	10.4	25.1
Echinoderm	12.9	1.5	6.4	0.0	19.6	21.9	19.3	11.7
Fishes	6.5	6.9	5.5	3.8	2.3	1.7	3.1	4.3

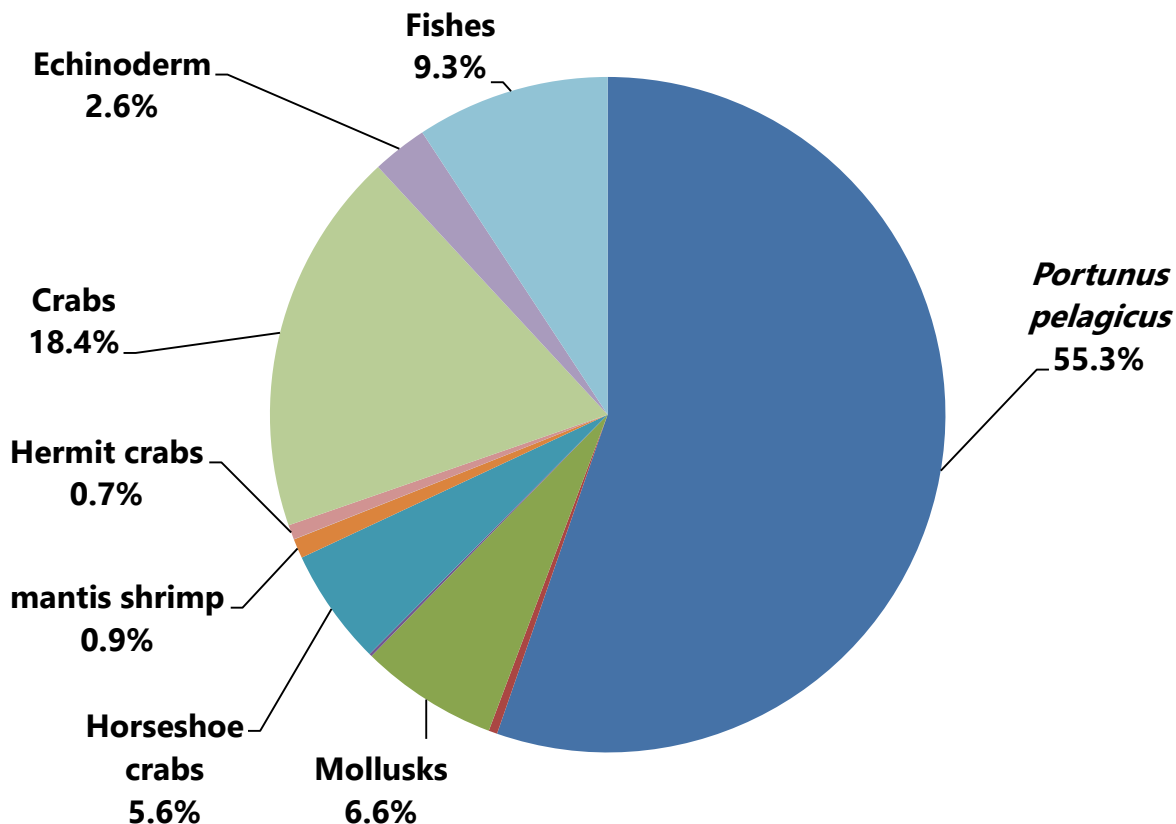


Figure 2 The Proportion of captured aquatic animal using floating seine, classified by group and weight of captured aquatic animal.

Table 3 The Proportion of captured aquatic animal using floating seine, classified by group and weight of captured aquatic animal.

Marine Animal Groups / Month	Oct/17 (%)	Nov/17 (%)	Dec/17 (%)	Jan/18 (%)	Feb/18 (%)	Mar/18 (%)	Apr/18 (%)	May/18 (%)
<i>Portunus pelagicus</i>	76.8	68.2	55.7	39.6	52.4	41.7	52.8	55.3
Coelenterata	0.0	0.2	2.2	0.0	0.2	0.2	0.1	0.4
Mollusks	0.6	1.4	6.0	6.3	12.4	13.6	5.8	6.6
Squids	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.1
Horseshoe crabs	0.0	8.2	3.8	16.8	0.0	1.9	8.4	5.6
mantis shrimp	3.6	1.1	0.4	0.0	0.1	1.1	0.1	0.9
Shrimps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hermit crabs	0.0	0.8	1.9	0.8	0.6	0.5	0.3	0.7
Crabs	7.4	6.6	17.1	10.8	27.3	32.7	27.0	18.4
Echinoderm	0.4	0.4	4.2	0.0	6.0	6.7	0.9	2.6
Fishes	11.2	13.2	8.6	25.6	1.0	1.4	3.8	9.3

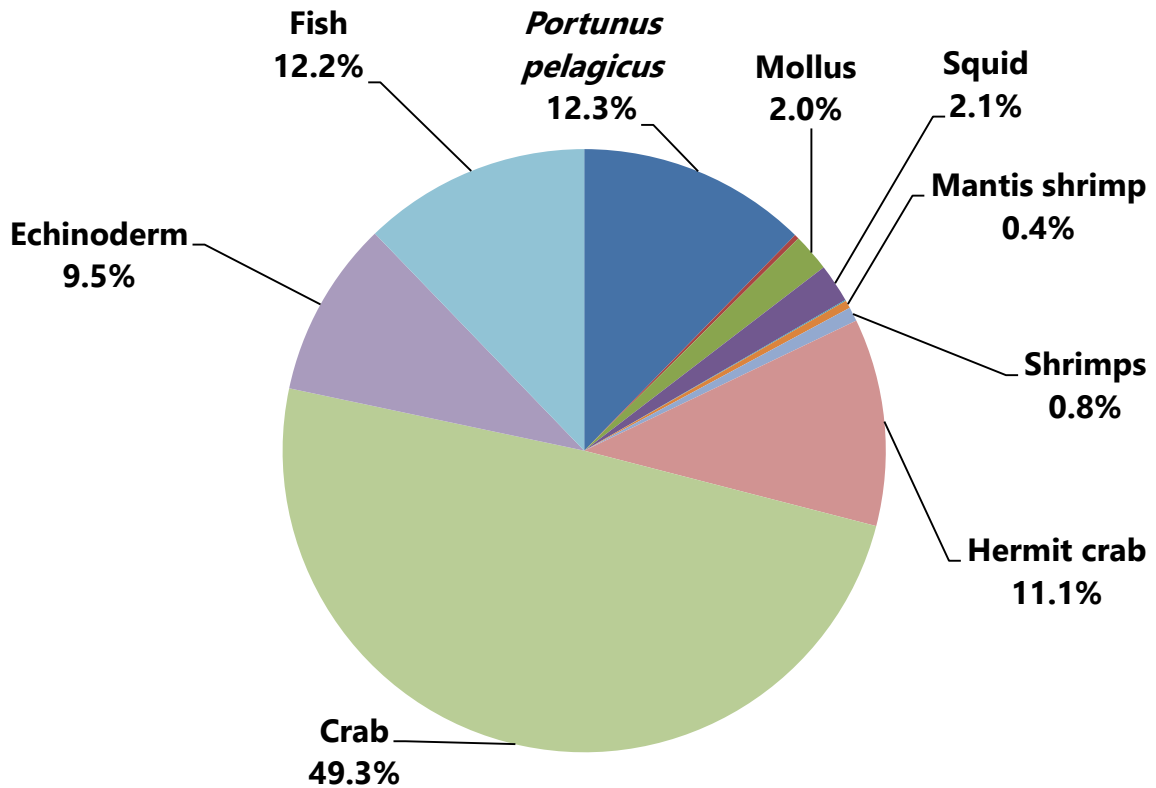


Figure 3 The proportion of captured aquatic animal using collapsible crab trap, classified by group and number of captured aquatic animal.

Table 4 The proportion of captured aquatic animal using collapsible crab trap, classified by group and number of captured aquatic animal.

<u>Marine Animal Groups / Month</u>	<u>Oct/17 (%)</u>	<u>Nov/17 (%)</u>	<u>Dec/17 (%)</u>	<u>Jan/18 (%)</u>	<u>Feb/18 (%)</u>	<u>Mar/18 (%)</u>	<u>Apr/18 (%)</u>	<u>May/18 (%)</u>	<u>Average (%)</u>
<i>Portunus pelagicus</i>	6.5	25.0	16.4	16.0	6.1	3.4	7.0	18.1	12.3
Coelenterata	0.0	0.0	1.3	0.2	0.1	0.0	0.3	0.0	0.2
Mollusks	1.4	0.0	3.3	4.6	2.8	0.9	2.1	1.2	2.0
Squids	0.0	0.0	0.0	6.0	4.8	1.6	2.7	1.5	2.1
Horseshoe crabs	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.1
Mantis shrimps	1.4	0.0	0.0	0.6	0.1	0.7	0.0	0.6	0.4
Shrimps	3.6	1.2	0.0	0.2	0.3	0.0	0.6	0.2	0.8
Hermit crabs	9.1	28.6	26.3	11.1	4.0	2.3	6.0	1.5	11.1
Crabs	62.4	21.4	30.3	37.2	64.8	71.9	48.6	57.8	49.3
Echinoderm	7.5	0.0	2.6	13.7	8.2	12.4	21.9	9.4	9.5
Fishes	8.1	23.8	19.7	10.1	8.8	6.7	10.9	9.6	12.2

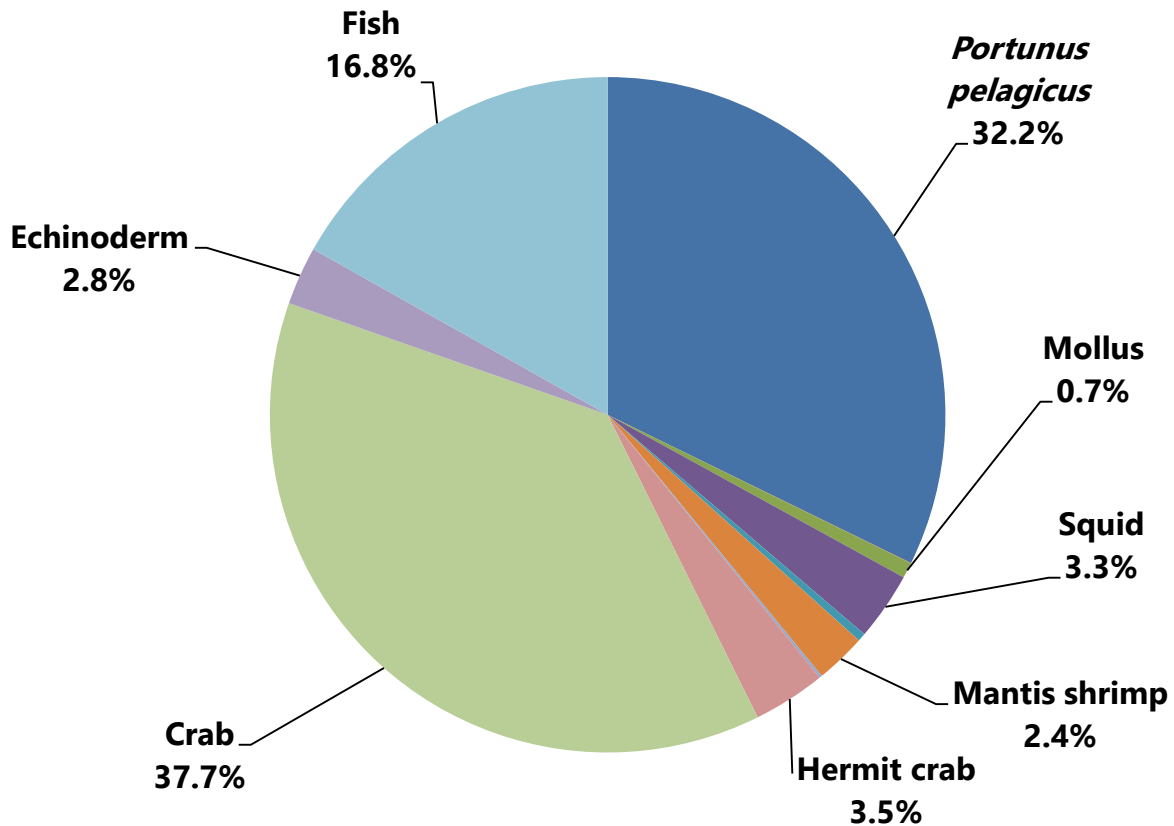


Figure 4 The Proportion of captured aquatic animal using collapsible crab trap, classified by group and weight of captured aquatic animal.

Table 5 The Proportion of captured aquatic animal using collapsible crab trap, classified by group and weight of captured aquatic animal.

<u>Marine Animal Groups / Month</u>	<u>Oct/17 (%)</u>	<u>Nov/17 (%)</u>	<u>Dec/17 (%)</u>	<u>Jan/18 (%)</u>	<u>Feb/18 (%)</u>	<u>Mar/18 (%)</u>	<u>Apr/18 (%)</u>	<u>May/18 (%)</u>	<u>Average (%)</u>
<i>Portunus pelagicus</i>	14.7	51.8	38.2	43.7	22.1	17.4	23.4	46.6	32.2
Coelenterata	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Mollusks	0.2	0.0	2.6	1.5	0.5	0.2	0.5	0.5	0.7
Squids	0.0	0.0	0.0	2.2	8.9	3.7	7.8	3.4	3.3
Horseshoe crabs	0.0	0.0	0.0	2.2	0.9	0.0	0.0	0.0	0.4
Mantis shrimps	7.7	0.0	0.0	6.4	1.7	1.1	2.0	0.5	2.4
Shrimps	0.2	0.5	0.0	0.1	0.1	0.1	0.0	0.1	0.1
Hermit crabs	8.1	4.3	5.8	3.9	1.6	1.1	2.5	0.5	3.5
Crabs	47.7	15.2	23.0	28.3	49.7	62.9	41.1	33.6	37.7
Echinoderm	1.8	0.0	1.0	3.9	2.0	4.1	6.0	3.6	2.8
Fishes	19.6	28.2	29.4	7.8	12.4	9.4	16.7	11.2	16.8