

## A study on by-catch of experimental Beach Sein in Ras Sader, North Suez Gulf, Egypt.

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### ABSTRACT

The by-catch of the experimental beach seine operating in Ras Sader coast, north Gulf of Suez during the period from autumn 2017 to summer 2018 was investigated. The by-catch amount 3-5 Kg per haul composed of fin fish species (89.6%) and shrimps (10.4%). About 25 fin fish species belong to 16 families; composed of two categories 20 juvenile of the commercially important species (40.6 %) and 5 low valued species (59.4%). *Ostorhinchus fasciatus*, *Apogonichthyoides taeniatus*, *Leiognathus berbis*, *Leiognathus elongates*, *Encrasicholina punctifer*, *Nemipterus japonicus* and *Trachurus indicus* dominated the assemblage of 25 species and contributed 73.1% of all sampled fishes. About 34.4% of juvenile of the commercially important species were recruitment in spring; 30.1% in summer 2018, 19.7% in autumn 2017 and 15.7% in winter.

### INTRODUCTION

The importance of shallow coastal marine habitats as nursery grounds for juvenile fishes is well established in the literature and it has been shown that a large number of fish species are dependent on these habitats during these juvenile phases (Bennett, 1989).

Typically, the adults spawn elsewhere in the sea and after metamorphosis the juvenile fishes enter the nursery grounds to complete their life cycle. They remain in their nursery grounds for some time, often no more than a year before vacating it for their adult habitat (El-Mor, 2002). Shallow coastal habitats offer advantages over the marine environment in the term of protection from predators and as an abundant food supply (Clark, 1974; Cushing, 1975; Lenanton, 1982; Boesch and Turner, 1984).

The aim of the present work is to determine the structure of juvenile fish community inhabiting coastal shallow water of Ras Sader, North Gulf of Suez to describe species composition, size structure of juvenile fishes and time of recruitment in the target area.

## MATERIALS AND METHODS

The by-catch of about 3-5 Kg per haul were collected seasonally by Experimental beach seine operating in Ras Sader coast during the period from autumn 2017 to summer 2018 was analyzed. The net is 6 meters long, 7 m width and 1.6 m height. It consists of a small bag with mesh size of 1-1.5 cm. The net was seasonally dragged on the bottom for a distance of about 100-300 m. The data were collected from 43 hauls in four seasons. The fishes sampled were preserved immediately on capture by immersion in 5-10 % sea water formalin. On the return to the laboratory fish samples were sorted and species identification for each fish was carried out based on criteria given by (Randall, 1983; Whitehead *et al.*, 1984; Smith and Heemstra, 1986; Humann and Deloach, 2002; Allen and Steene, 2005 and Golani *et al.*, 2006). The total length (cm) and total weight (gm) of each fish species were measured. The study area Ras Sader Coast 29° 35' 30" N 32° 42' 20" E (Fig. 1) is 200 km from Cairo and approx. 60 km from the Ahmed Hamdi Tunnel crossing in Suez, on the western side of the Sinai Peninsula, and almost opposite the resort of El-Sokhna on the opposite Red Sea coastline. Ras Sader has a 95 km beach coastline with hot desert climate.

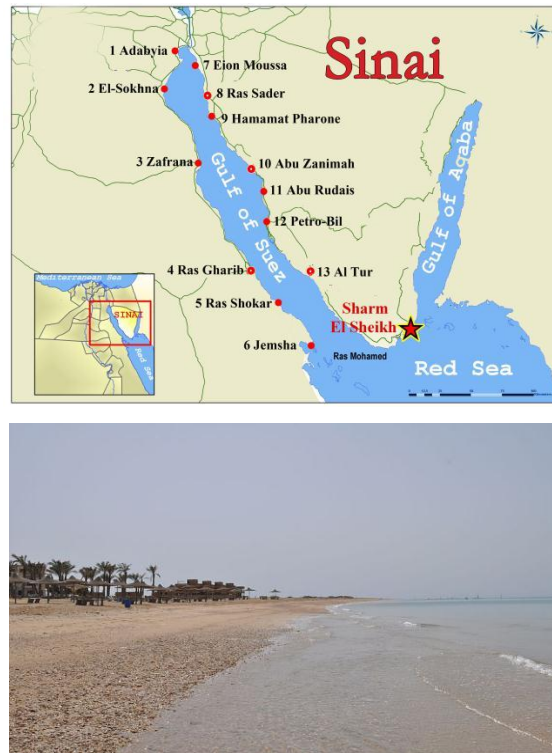


Fig. 1: Map showing the study area Ras Sader, north Gulf of Suez, Egypt.

## RESULTS

### Species composition and overall abundance

The by-catch amounted 3-5 Kg per haul composed of fin fish species (89.6%) and shrimp (10.4%). In the present study, the shrimp is represented by *Metapenaeopsis stridulans* and *Trachipenaeus curvirostrus*. A total of 9039 fish individuals have been collected in one year by the experimental beach seine from autumn 2017 to summer 2018. The fin fish species can be classified into categories: Juvenile of the commercial important species and low valued species. Juvenile of the commercially important species constituted 40.6% of the total fin fish by-catch

which were represented by 20 species belonging to 13 families such as: Carangidae (11.7% of the total fin fish by-catch), Nemipteridae (7.0%), Synodontidae (6.1%), Mullidae (4.4%), Haemulidae (2.6%) and Mugilidae (2.4%). They were the main components of juvenile of the commercial important species. Low valued species constituted 59.4% of the total by-catch which were represented by 5 abundant species belonging to 3 families; Apogonidae (27.1%), Leiognathidae (22.2%) and Engraulidae (10.1%) (Table 1).

Table 1: Fin fish species composition and overall abundance (%) in the by-catch taken by experimental beach seine operating in Ras Sader coast during the period from autumn 2017 to summer 2018.

Families	Species	Abundance		Range of total length (cm)	Average of total weight (gm)
		No.	%		
<b>1- Juveniles of commercially important fish species</b>					
Carangidae	<i>Trachurus indicus</i> (Nekrasov, 1966) <b>Arabian scad</b>	602	6.7%	2.8 - 7.8	11.4±1.39
	<i>Decapterus maruadsi</i> (Temminck & Schlegel, 1843) <b>Arabian scad</b>	333	3.7%	2.9 – 8.1	10.4±1.08
	<i>Alepes djedaba</i> (Forsskal, 1775) <b>Shrimp scad</b>	121	1.3%	3.2 9.2	11.3±1.51
Nemipteridae	<i>Nemipterus japonicus</i> (Bloch, 1791) <b>Japanese thread fin bream</b>	632	7.0%	2.9 - 11.5	15.5 ±1.24
Synodontidae	<i>Saurida undosquamis</i> (Richardson, 1848) <b>Brushtooth lizard fish</b>	331	3.7%	3.0 - 10.1	10.7±1.39
	<i>Synodus variegatus</i> (Lacepede, 1803) <b>Variiegated lizard fish</b>	205	2.3%	2.9 -11.3	10.9±1.56
	<i>Synodus myops</i> (Forster, 1801) <b>Snake fish</b>	7	0.1%	3.1 – 10.8	10.6±1.44
Mullidae	<i>Upeneus japonicus</i> (Houttuyn, 1782) <b>Japanese goat fish</b>	241	2.7%	2.8 - 7.4	9.8±1.57
	<i>Upeneus asymmetricus</i> (Lachner, 1954) <b>Asymmetrical goat fish</b>	148	1.6%	2.9 -10.4	10.1±1.64
	<i>Upeneus sulphureus</i> (Cuvier, 1829) <b>Sulphur goat fish</b>	5	0.1%	2.9 – 8.8	8.3±1.07
Haemulidae	<i>Pomadasys stridens</i> (Forsskal, 1775) <b>Striped piggy</b>	235	2.6%	2.4- 5.8	7.3±0.84
Mugilidae	<i>Liza carinata</i> (Valenciennes, 1836) <b>Keeled mullet</b>	217	2.4%	1.9- 3.3	6.9±0.73
Terapontidae	<i>Terapon jarbua</i> (Forsskal, 1775) <b>Jarbua terapon</b>	155	1.7%	2.9-6.6	7.1±0.70
Platycephalidae	<i>Platycephalus bassensis</i> (Cuvier, 1829) <b>Southern sand flat head</b>	131	1.4%	3.3 - 10.2	11.4±1.87
Congridae	<i>Conger cinereus</i> (Ruppell, 1830) <b>Long African conger</b>	101	1.1%	3.9 - 14.4	12.7±1.91
Fistulariidae	<i>Fistularia commersonii</i> (Ruppell, 1838) <b>Blue spotted cornet fish</b>	88	1.0%	5.1 - 18.7	22.5±2.43
Sparidae	<i>Diplodus noct</i> (Valenciennes, 1830) <b>Red sea bream</b>	80	0.9%	2.8 - 7.4	11.3±1.33
	<i>Rhabdosargus haffara</i> (Forsskal, 1775) <b>Haffara sea bream</b>	12	0.1%	2.9 -8.2	11.7±1.54
	<i>Scorpaenopsis barbata</i> (Rüppell, 1838) <b>Bearded scorpion fish</b>	15	0.2%	4.1 - 10.2	17.3±2.33
Triglidae	<i>Lepidotrigla multispinosa</i> (Smith, 1934) <b>Indian ocean spiny gurnard</b>	10	0.1%	3.1 - 9.4	12.2±2.33
<b>Total number of juveniles commercially important fish species</b>		<b>3669</b>	<b>40.6%</b>		
<b>2- Low valued fish species</b>					
Apogonidae	<i>Ostorhinchus fasciatus</i> (White, 1790) <b>Broadbanded cardinal fish</b>	1277	14.1%	2.1 - 4.3	7.3±0.66
	<i>Apogonichthyoides taeniatus</i> (Cuvier, 1828) <b>Twobelt cardinal fish</b>	1179	13.0%	1.9 - 3.6	6.8±0.51
Leiognathidae	<i>Leiognathus berbis</i> (Valenciennes, 1835) <b>Berber pony fish</b>	1047	11.6%	1.3 - 2.2	3.2±0.41
	<i>Leiognathus elongatus</i> (Gunther, 1874) <b>Slender pony fish</b>	955	10.6%	1.5 – 2.1	3.5±0.52
Engraulidae	<i>Encrasicholina punctifer</i> (Fowler, 1938) <b>Buccaneer anchovy</b>	912	10.1%	1.9 - 2.5	3.1±0.42
	<b>Total number of low valued fish species</b>	<b>5370</b>	<b>59.4%</b>		
<b>Total number of all fish species</b>		<b>9039</b>			

### Seasonally relative abundance and size composition

A total of 9039 fish juvenile individuals have been collected in one year by the experimental beach seine from autumn 2017 to summer 2018. Juveniles of commercially important fish species were recoded all the year round with the abundance were higher in the seasons (spring and summer). A total of 1263 Juvenile fish were collected in spring followed by 1106 Juvenile fish in summer. Juveniles of commercially important fish species were low individuals both in autumn and winter with 724 and 576 juvenile numbers respectively (Table 2).

Table 2: Seasonally relative abundance and size composition in the by-catch taken by experimental beach seine Operating in Ras Sader coast during the period from autumn 2017 to summer 2018.

Family	Species	Autumn2017			Winter			Spring			Summer 2018		
		No.	%	Size (cm)	No.	%	Size (cm)	No.	%	Size (cm)	No.	%	Size(cm)
Carangidae	<b>1- Juveniles of commercially important fish species</b>												
	<i>Trachurus indicus</i>							411	4.55	1.8-5.1	191	2.11	3.1-7.8
	<i>Decapterus maruadsi</i>							246	2.72	2.9-4.3	87	0.96	3.1-8.1
	<i>Alepes djedaba</i>							55	0.61	3.2-7.1	66	0.73	4.1-9.2
Nemipteridae	<i>Nemipterus japonicus</i>							372	4.12	4.2-10.9	260	2.88	9.2-11.5
Synodontidae	<i>Saurida undosquamis</i>	213	2.36	3.0-6.4							118	1.31	1.2-10.1
	<i>Synodus variegatus</i>	67	0.74	2.9-7.4	138	1.53	4.1-11.3				7	0.08	3.1-10.8
	<i>Synodus myops</i>												
Mullidae	<i>Upeneus japonicus</i>	111	1.23	2.8-5.1							130	1.44	3.7-7.4
	<i>Upeneus asymmetricus</i>	48	0.53	2.9-6.1									
	<i>Upeneus sulphureus</i>	5	0.06	2.9-8.8							100	1.11	3.9-10.4
Haemulidae	<i>Pomadasys stridens</i>	84	0.93	2.5-3.9	151	1.67	2.4-5.8						
Mugilidae	<i>Liza carinata</i>				94	1.04	1.9-3.1	123	1.36	1.9-3.3			
Terapontidae	<i>Terapon jarbua</i>	100	1.11	2.9-4.7	55	0.61	2.99-6.6						
Platycephalidae	<i>Platycephalus bassensis</i>	55	0.61	3.33-5.2	76	0.84	4.1-10.2						
Congridae	<i>Conger cinereus</i>							46	0.51	3.9-11.1	55	0.61	5.2-14.4
Fistulariidae	<i>Fistularia commersonii</i>	41	0.45	5.1-11.4	47	0.52	6.7-18.7						
Sparidae	<i>Diplodus noct</i>										80	0.89	2.8-7.4
	<i>Rhabdosargus haffara</i>										12	0.13	2.9-8.2
Scorpaenidae	<i>Scorpaenopsis barbata</i>				15	0.17	4.1-10.2						
Triglidae	<i>Lepidotrigla multispinosa</i>							10	0.11	3.1-9.4			
	<b>Total number of juveniles commercially important fish species in different seasons</b>	724	19.7%		576	15.7%		1263	34.4%		1106	30.1%	
	<b>2- Low valued fish species</b>												
Apogonidae	<i>Ostorhinchus fasciatus</i>	844	9.34	2.1-3.7							433	4.79	2.1-4.3
	<i>Apogonichthyoides taeniatus</i>	735	8.13	1.9-2.2							444	4.91	1.9-3.6
Leiognathidae	<i>Leiognathus berbis</i>				900	9.96	1.3-1.9	147	1.63	1.3-2.2			
	<i>Leiognathus elongatus</i>				614	6.79	1.5-1.9	341	3.77	1.5-2.1			
Engraulidae	<i>Encrasicholina punctifer</i>	611	6.76	1.8-2.4	301	3.33	1.9-2.6						
	<b>Total number of low valued fish species in different seasons</b>	2190	40.8		1815	33.8		488	9.1		877	16.3	
	<b>Total number of all fish species in different seasons</b>	2914	32.2%		2319	26.5%		1751	19.4%		1983	21.9%	

Low valued fish species were recoded all the year round with the abundance were higher individuals in the seasons (autumn -winter). A total of 2190 low valued fish individuals were collected in autumn followed by 1815 fish in winter. Low valued fish species were low individuals in summer with 877 individuals and rare recorded in spring with 488 individuals.

The juvenile of *Trachurus indicus* recruitment were in spring (4.55%) and summer (2.11% of the total fin fish by-catch), varying between 2.8 and 7.8 cm total length (Table 1 & 2). The juveniles of *Decapterus maruadsi* were recruited in spring (2.72%) and summer (0.96%) varying between 2.9 and 8.1cm T.L. The juveniles of *Alepes djedaba* were recruited in spring (0.61%) and summer (0.73%) varying between 3.2 and 9.2cm T.L.

The juveniles of *Nemipterus japonicus* were present in the samples by-catch from spring (4.12%) to summer (2.88%) varying between 9.2 and 11.5 cm T.L.

The juveniles of *Saurida undosquamis* were present in the samples by-catch from autumn (2.36%) to summer (1.31%) varying between 3.0 and 10.5 cm T.L. The juveniles of *Synodus variegatus* were present in the samples by-catch from autumn

(0.74%) to winter (1.53%) varying between 2.9 and 11.3 cm T.L. The juveniles of *Synodus myops* were present in the samples by-catch in summer (0.08%) varying between 3.1 and 10.8 cm T.L.

*Upeneus japonicas* were present in autumn (1.23%) and summer (1.44%), varying between 2.8 and 7.4cm T.L. The juveniles of *Upeneus asymmetricus* were present in the samples by-catch from autumn (0.53%) to summer (1.11%) varying between 2.9 and 10.4 cm T.L. The juveniles of *Upeneus sulphureus* were present in the samples by-catch in autumn (0.06%) varying between 2.9 and 8.8 cm T.L.

*Pomadasys stridens* (2.4 – 5.8 cm T.L.) was recorded during the period from autumn (0.93%) to winter (1.67%).

The juveniles of *Liza carinata* were present in samples from winter (1.04%) to spring (1.36%) varying between 1.9 and 3.3 cm T.L.

The recruitment of *Terapon jarbua* took place in autumn (1.11%) and winter (0.61%), varying between 2.9 and 6.6 cm T.L.

The recruitment of *Platycephalus bassensis* took place in autumn (0.61%) and winter (0.84%), varying between 3.3 and 10.2 cm T.L.

About 46 fish collected from *Conger cinereus* in spring (0.51%) and 55 fish individuals in summer (0.61%), varying between 3.9 – 14.4 cm T.L.

The juveniles of *Fistularia commersonii* were recruitment in autumn (0.45%) and winter (0.52%), varying between 5.1 and 18.7 cm T.L.

While 80 fish specimens collect from *Diplodus noct* in winter (0.17%), varying between 4.1 and 10.2 cm T.L. while about 12 fish specimens collected from *Rhabdosargus haffara* in summer (0.13%), varying between 2.9 and 8.2 cm T.L.

The juveniles of 15 specimens of *Scorpaenopsis barbata* were present in samples in winter (0.17%) varying between 4.1 and 10.2 cm T.L.

The juveniles of 10 specimens of *Lepidotrigla multisptinosa* were present in fish samples in spring (0.11%) varying between 3.1 and 9.4 cm T.L.

On the other hand the low valued fish species such as *Ostorhinchus fasciatus* were dominant in autumn (9.34%) and summer (4.79%), varying between 2.1 – 4.3 cm T.L. Also the other species *Apogonichthyoides taeniatus* from family Apogonidae were recruitment in autumn (8.13%) and in summer (4.91%), varying between 1.9 – 3.6 cm T.L.

*Leignathus berbis* were dominant in winter (9.96%) and spring (1.63%), varying between 1.3 – 2.2 cm T.L. Also, *Leignathus elongateus* were present in the samples during winter (6.79%) and spring (3.77%), varying between 1.5 - 2.1cm T.L. About 611 fish collected from *Encrasicholina punctifer* in autumn (6.76%) and 301 specimens in winter (3.33%), varying between (1.9 – 2.6 cm T.L.) (Tables 1 & 2).

## DISCUSSION

The by-catch of experimental beach seine net in Ras Sader, North Gulf of Suez was analyzed. The north Gulf of Suez is biologically an economically valuable as a breeding and nursery ground for some commercially valuable fish species (El-Ganainy, 1992; El-Ganainy *et al.* 2006; Gab-Alla *et al.* 2007 and Abd El-Naby *et al.*, 2018). In the Gulf of Suez, many fin fish species are caught by several fishing gears as by-catch which is defined as incidental catch and discarded or released catch (Clucas, 1997 and El-Ganainy, *et al.* 2006). In the present study the by-catch amounted 3-5 Kg per haul composed of fin fish species (89.6%) and shrimp (10.4%). The fin fish species were represented by 25 species, belonging to 16 families. El Mor, (2002) analyze the size and species composition of experimental beach seinein

Deversoir, lake Timsah and Great Bitter lakes, Suez canal, He was identified 26 fish species representing 20 families, among these 15 species are known to be Red Sea immigrant species. Ahmed *et al.*, (2004) studied the by-catch of experimental beach seine in great Bitter lakes, Suez Canal, they were identified 12 species belonged to 11 families. El-Ganainy *et al.*, (2006) were studied the bottom trawl discards in the Gulf of Suez; they were collected 51 fish species. Abd El-Naby *et al.*, 2018 studied the by-catch of the experimental beach seine operating in Eion Moussa coast, north Gulf of Suez during the period from autumn 2017 to summer 2018 was analyzed. The by-catch amount 3-5 Kg per haul composed of fin fish species (84.3%) and shrimp (15.7%) and they recorded about 17 fin fish species belonged to 14 families. It is known that the differences in fish richness are attributed to either unequal collection (different sites, methods and season) or reduction of number owing to specific condition of certain habitat (Bennett, 1989). In the present study, 20 juveniles of the commercially important species were represent 40.6% of total fin fish by-catch of the gear, belonged to 13 families such as *Carangidae*, *Nemipteridae*, *Synodontidae*, *Mullidae*, *Haemulidae*, *Mugilidae*, *Terapontidae*, etc. Further, the update list of fin fish species in north Gulf of Suez waters given by El-Ganainy *et al.*, (2006) and Abd El-Naby *et al.*, (2018) included all fish families recorded in the present work. In the current study, the juveniles of *Trachurus indicus*, *Decapterus maruadsi*, *Alepes djedaba*, *Nemipterus japonicas*, *Saurida undosquamis*, *Synodus myops*, *Upeneus japonicas*, *Upeneus asymmetricus*, *Upeneus sulphureus*, *Conger cinereus*, *Diplodus noct*, *Rhabdosargus haffara* and *Lepidotrigla multispinosa* recruitment in Autumn, spring and summer months. While the juveniles of *Synodus variegatus*, *Pomadasys stridens*, *Liza caranita*, *Terapon jarbua*, *Platycephalus bassensis*, *Fistularia commersonii* and *Scorpaenopsis barbata* recruitment in winter. This is in agreement with spawning seasons of the previous species for instance: January till May for *Trachurus indicus* (Sanders and Morgan, 1989), December till May for *Decapterus maruadsi* (Calumpong *et al.*, 1993), February till June for *Alepes djedaba* (Shuaib and Ayub, 2011), January till April for *Nemipterus japonicas* (Russel, 1990), March till June for *Saurida undosquamis* (Sanders and Morgan, 1989), August till October for *Synodus variegatus* (Allen and Adrim, 2003), March till June for *Synodus myops* (Sadovy and Cornish, 2000), May till August for *Upeneus japonicas* (Wahbeh and Ajiad, 1985), for *Upeneus asymmetricus* (Allen and Swainston, 1988), for *Upeneus sulphureus* (Kembaren and Ernawati, 2011), November till February for *Liza carinata* (Hefny *et al.*, 2016) and for *Pomadasys stridens* (Ben Tuvia and Mckay, 1986), July till November for *Terapon jarbua* (Jeyaseelan, 1998), May till August for *Platycephalus bassensis* (Kailola *et al.*, 1993), from November till March for *Conger cinereus* (Castle, 1984), June till August for *Fistularia commersonii* (Watson and SandKnop, 1996), March till May for *Diplodus noct* and *Rhabdosargus haffara* (Bauchot and Smith, 1984), from September till November for *Scorpaenopsis barbata* (Randall, 2001), May till September for *Leiognathus berbis* and *Leiognathus elongates* (Lee *et al.*, 2005), August till February for *Encrasicholina punetifer* (Tiews *et al.*, 1971). The damage caused by the trawling net effected badly on stock resources of North Gulf of Suez coast, which can be considered as nursery ground in which small fish individuals were caught before Sexual maturation (Lenanton, 1982). Therefore, it is necessary to consider restrictions to trawling and illegal fishing gears operating in nursery grounds, north Gulf of Suez.

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## ARABIC SUMMARY

دراسة الصيد الجانبي لشبكة الجرف التجريبيه في رأس سدر، شمال خليج السويس، مصر

- أحمد سمير عبد النبي<sup>١</sup> - عزة عبد الحميد الجنائني<sup>٢</sup> - معالي عبد الرحمن محمد<sup>١</sup> - محمد المر<sup>٣</sup>
- ١- قسم بحوث البيئة وبيولوجيا الأسماك -المعمل المركزي لبحوث الثروه السمكية -العباسة - مصر.
  - ٢- معمل بيولوجيا المصايد-المعهد القومي لعلوم البحار المصايد -السويس -مصر.
  - ٣- قسم علوم البحار- جامعة قناة السويس الاسماعيليه -مصر.

تم دراسة الصيد الجانبي لشبكة الجرف التجريبيه العامله في رأس سدر - شمال خليج السويس - مصر في الفترة من خريف ٢٠١٧ الي الصيف ٢٠١٨. الصيد الجانبي كان بوزن ٣-٥ كجم لكل جرة وكان يتكون من أنواع أسماك زعنفيه بنسبة ٨٩.٦% وجمبري بنسبة ١٠.٤%.

تم تجميع ٢٠ نوع سمك تنتمي الي ١٦ عائله؛ هذه الاسماك تنقسم الي ٢٠ نوع تنتمي لاسماك صغار تجارية بنسبة ٤٠.٦% و٥ أنواع قليلة الأهميه بنسبة ٥٩.٤% من الأنواع التي تم تجميعها .

*Ostorhinchus fasciatus*, *Apogonichthyoides taeniatus*, *Leiognathus berbis*, *Leiognathus elongates*, *Encrasicholina punctifer*, *Nemipterus japonicus* and *Trachurus indicus*.

وكانت الأنواع السائدة تشكل ٧٣.١% من حجم الصيد الجانبي للأسماك وكان هناك حوالي ٣٤.٤% من صغار الأسماك التجارية الهامة تتوارد في المنطقة في فصل الربيع وحوالي ٣٠.١% في صيف ٢٠١٨ وحوالي ١٩.٧% في خريف ٢٠١٧ وحوالي ١٥.٧% في فصل الشتاء.