



## Larval fish assemblages in the Foz do Amazonas Basin

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**Abstract:** A total of 998 larval fish were identified offshore of the Amapá coast between March and April 2015. This amount comprised 49 families and 69 species. The family Myctophidae had the highest number of taxa identified and its larvae were also the most abundant. This study has contributed to the ichthyoplankton knowledge of the Brazilian north coast.

**Keywords:** Brazilian north coast, composition, ichthyoplankton, South Atlantic

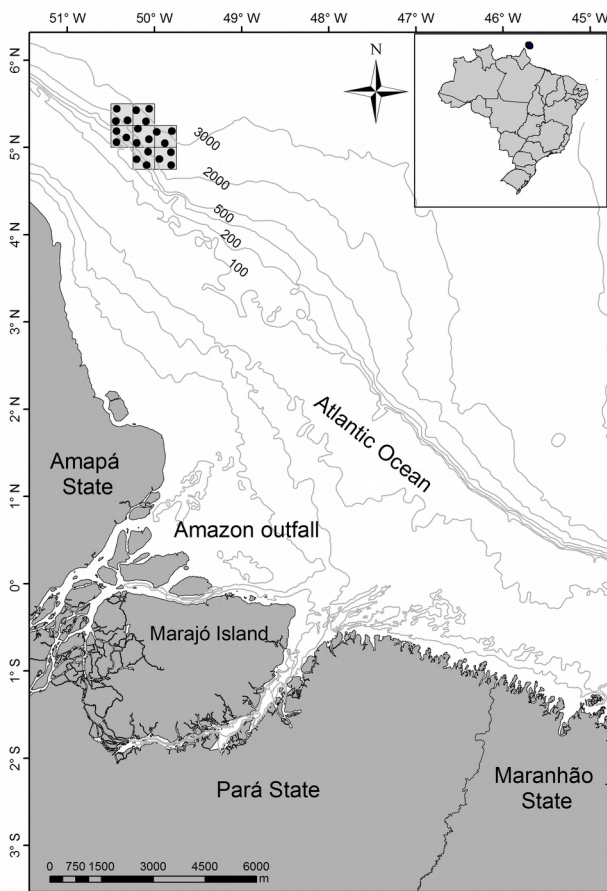
**Resumo. Assembleia de larvas de peixes da Bacia da Foz do Amazonas.** Foi identificado um total de 998 larvas de peixes, na região oceânica do Amapá entre março e abril de 2015, compreendendo 49 famílias e 69 espécies. A família Myctophidae foi a mais abundante e apresentou o maior número de táxons. Esse estudo contribuiu com o conhecimento do ictioplâncton da costa norte brasileira.

**Palavras-Chaves:** costa norte brasileira, composição, ictioplâncton, Atlântico Sul.

Coastal areas off Brazil are under oil exploitation and this potentially represents an environmental risk. Some of these areas include national reserves and represent important spots for biodiversity conservation. The Amapá State is located in the north Brazilian coast (05°N) and 62% of its territory is protected being the most ecologically preserved Brazilian state (Cunha *et al.* 2013). Although the Amapá coastline is ecologically important, little is known about the marine organisms of this area. The preserved areas, including the Orange Cape National Park, are approximately 60 km from seven oil exploitation blocks in a water column depth of 200-3,000 m and could be affected in case of an oil spill (Silva & Magrini 2014). In the Brazilian north coast there are only a few ichthyoplankton studies and most are available as conference abstracts, monographs and theses (*e.g.* Campos 2005, Zacardi *et al.* 2008, Ferreira *et al.* 2014). Therefore, we aimed to contribute to our knowledge of the larval fish community in the oceanic waters where the oil and gas exploitation blocks are located.

The Atlantic Ocean region comprising the study area is a high energy environment due to the following factors: the presence of the Northern Brazil Current, tidal oscillations, trade winds and the launching of continental waters originating from the Amazonas and Pará rivers (Brandini *et al.* 1997). The Northern Brazil Current (NBC) is formed south of 10° 30'S (Paiva 2001). In front of the mouth of the Amazon River, fresh water moves away from the coast and extends over 120 km (Paiva 2001). The plume of the Amazon River can provide high productivity that can extend many miles from the coast (Melo 2004). This area has high biological productivity and is considered one of the most productive in Brazil (Frédou & Asano-Filho 2006). The Guiana Current that follows to the northwest, bathing the Brazilian north coast, meets the waters of the Amazon River that are discharged in the coast and also follow the flow towards the northwest (PNCO 2010). The climate of the region is tropical humid and super humid, with annual thermal averages oscillating between 26 and 28 °C and rainfall is greater than 3,000 mm a year (PNCO 2010).

Samples used in this study were part of a multidisciplinary study involving data on water quality, bacterioplankton, phytoplankton, zooplankton, meiofauna, macrofauna and sightings of nektonic megafauna (PIR2/Bravante 2016). Temperature and salinity were measured in each oceanographic station along the water column up to five meters above the bottom using a CTD profiler (SBE-19 plus, Seabird Scientific, Washington, USA). Twenty-one sampling stations were distributed in the oceanic region of the Foz do Amazonas Basin (Fig. 1), between 30 March and 29 April 2015 (austral winter), during the day (7:50 am - 5:50 pm) and at night (7:50 pm - 5:25 am). Local depths varied from 285 m to 3,160 m.



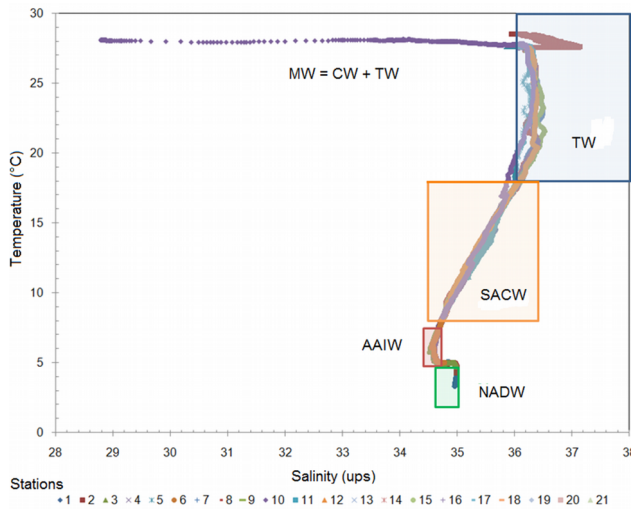
**Figure 1.** Location of the sampling stations on the extreme north of the Brazilian Equatorial Margin - Amapá coast. Sampling stations were distributed across seven oil exploitation blocks represented here by squares.

Oblique hauls were done to a maximum depth of 200 m using a bongo net with 330 and 500  $\mu\text{m}$  mesh size, lasting on average nine minutes. Hauls were conducted at a speed of approximately  $1 \text{ m}\cdot\text{s}^{-1}$ . Two flowmeters (2030R, General Oceanics, Miami, USA) were attached to the net mouths and an aver-

age volume of  $244.4 \text{ m}^3$  was filtered. Samples were immediately fixed after capture in a buffered 4% formaldehyde-seawater solution. Larval densities were standardized to larvae. $100 \text{ m}^{-3}$ . Larvae were sorted from samples and preserved in 70% ethanol, except for leptocephali, which were preserved in formalin 4% to avoid shrinkage. Identification was done to the lowest taxonomical level possible using specialized guides. Fish larvae were classified based on their stage of development (yolk-sac, preflexion, flexion, postflexion and juvenile stages). The standard length (SL) was measured (0.1 mm resolution). Species were categorized according to adult habitat (coastal-shelf and oceanic). Damaged or very small larvae were grouped as unidentified. Identified larvae were deposited in the larval fish collection of the Laboratório Integrado de Zooplâncton e Ictioplâncton da Universidade Federal do Rio de Janeiro, Brazil (DZUFRJ). The larval frequency of occurrence (FO%) was calculated according to Guille (1970).

Temperature and salinity data obtained along the water column was similar in the 21 oceanographic stations. These values showed the presence of five water masses in the study area: Mixture Water (Coastal Water + Tropical Water), Tropical Water (TW), South Atlantic Central Water (SACW), Antarctic Intermediate Water (AAIW) and North Atlantic Deep Water (NADW) (Fig. 2). Mixture Water was observed up to 100 meters and TW was found from 0 to 140 m. South Atlantic Central Water occupied the strata 130-450 m. The layer 480-1,000 m was dominated by AAIW and below 1,000 m NADW was detected. Ichthyoplankton was sampled up to 200 m layer which was influenced by, MW, TW and SACW according to temperature and salinity measured during the sampling period (Fig. 2).

A total of 998 larval fish were identified in the study area, comprising 49 families and 69 species (Table I). Although there were more coastal families (29%), oceanic species were more abundant (53%) than coastal-shelf species (47%). The results obtained showed that there is a transitional larval fish assemblage in this area but future studies to understand the influence of current patterns on larval fish distribution in this area should be done. Total body length of larval collected in our study ranged from 2.1 a 32.9 mm in 330  $\mu\text{m}$  samples and from 2.0 to 14.5 mm in samples obtained with 500  $\mu\text{m}$ . In the study area preflexion larval stage dominated (> 50%) and this fact could be related to recent spawning. The spawning mode of fish families will influence the pelagic larval duration (Floeter & Gasparini



**Figure 2.** TS-diagram of the 21 oceanographic stations obtained from CTD profiles in the study area during the sampling period. MW = Mixture Water (Coastal Water + Tropical Water), TW = Tropical Water, SACW = South Atlantic Central Water, AAIW = Antarctic Intermediate Water and NADW = North Atlantic Deep Water. Modified from PIR2/Bravante (2016).

2000). Although, there is little information in how long larvae of the identified families stay in plankton in the study area, the dominance of preflexion larvae suggested that the spawning occurred few days or hours before sampling. Most families identified in the study area occur commonly along the Brazilian coast (e.g. Bonecker & Castro 2006, Bonecker *et al.* 2014, Stocco & Joyeux 2015). The Ilyophinae species C1 (family Synphobranchidae) were not previously recorded in the larval stage in ichthyoplankton studies undertaken in Brazil. However, according to Smith (1989) it occurs in the Gulf of Mexico, Bermuda, Guiana and the South Atlantic Ocean (off the Brazil-Uruguay boundary). Melo (2007) recorded ten species of Synphobranchidae from the western South Atlantic, but none were

Ilyophinae species C1. Larvae of 19 families identified in the study area (Table I) were new records for the ichthyoplankton of the region. According to Bitencourt (2004) and Zacardi *et al.* (2008), families that are characteristic of the Amapá and Amazon coasts are: Scombridae, Carangidae, Engraulidae, Sciaenidae (all with commercial value in the region), Gobiidae (ecological importance), Clupeidae and Myctophidae. These families, in addition to Ophichthidae, Congridae, Gonostomatidae, Paralepididae, Bregmacerotidae, Exocoetidae, Seranidae, Priacanthidae, Bramidae, Pomacentridae, Labridae, Scaridae, Acanthuridae, Sphyrnaeidae, Gempylidae, Nomeidae, Pleuronectidae, Paralichthyidae, Bothidae, Balistidae and Monacanthidae seem to be the most frequent in the study area as they were collected in more than two previous studies off the north coast. The family Myctophidae had the highest number of taxa identified, including 12 species (Table I). Larvae of this family were also the most frequent in samples from both mesh sizes (> 70%) followed by *Cyclothone* sp., Gobiidae unidentified, Scombridae unidentified and *Syacium papillosum* (Table I). Myctophid fishes were also the most diverse and abundant in a study undertaken in tropical and equatorial Atlantic waters (Olivar *et al.* 2017). Maximum average density recorded in the study area was 2.20 larvae.100 m<sup>-3</sup> for myctophid unidentified, which dominated the larval assemblage of the Foz do Amazonas Basin (Table I). Myctophid larvae generally dominate in oceanic waters around the world (Castro *et al.* 2010, Catul *et al.* 2011, Bolshakova & Evseenko 2016). Larvae of many of the families and species identified in this study have not been previously caught off the Brazilian north coast as discussed above, confirming the contribution of this study to the knowledge of the larval fish community from this area.

**Table I.** Taxonomic list of all identified larval fish taxon collected with a bongo net. unid. = unidentified; Total = total density (larvae.100 m<sup>-3</sup>); A = average density (larvae.100 m<sup>-3</sup>); SD = standard deviation; FO (%) = frequency of occurrence. Families in bold were new larval fish records for the Brazilian north coast.

Taxon	Adult habitat	Mesh size	330 µm				500 µm			
			Total	A	SD	FO (%)	Total	A	SD	FO (%)
<b>Anguilliformes</b>	Anguilliformes unid.	Coastal-shelf	2.63	0.13	0.21	28.57	2.87	0.14	0.27	23.81
<b>Muraenidae</b>	Muraenidae unid.	Coastal-shelf	0.89	0.04	0.19	4.76	1.89	0.09	0.41	4.76
	<i>Gymnothorax</i> sp.	Coastal-shelf	0.48	0.02	0.11	4.76	1.13	0.05	0.14	14.29
<b>Synphobranchidae</b>	Ilyophinae species C1	Oceanic	0.41	0.02	0.09	4.76	0.00	0.00	0.00	0.00
<b>Ophichthidae</b>	Ophichthidae unid.	Coastal-shelf	0.00	0.00	0.00	0.00	0.49	0.02	0.11	4.76
	<i>Myrophis plumbeus</i>	Coastal-shelf	0.00	0.00	0.00	0.00	0.65	0.03	0.10	9.52
	<i>Ophichthus cylindroideus</i>	Coastal-shelf	0.35	0.02	0.08	4.76	0.00	0.00	0.00	0.00

Taxon	Adult habitat	Mesh size		330 µm			500 µm			
		Total	A	SD	FO (%)	Total	A	SD	FO (%)	
<b>Congridae</b>	Congridae unid.	Coastal-shelf	2.48	0.12	0.39	14.29	1.24	0.06	0.15	14.29
	<i>Uroconger</i> sp.	Coastal-shelf	0.00	0.00	0.00	0.00	0.29	0.01	0.06	4.76
	<i>Heteroconger</i> sp.	Coastal-shelf	0.00	0.00	0.00	0.00	0.36	0.02	0.08	4.76
<b>Clupeidae</b>	Clupeidae unid.	Coastal-shelf	0.30	0.01	0.07	4.76	0.00	0.00	0.00	0.00
<b>Gonostomatidae</b>	<i>Cyclothone</i> sp.	Oceanic	8.53	0.41	0.39	61.90	4.08	0.19	0.30	38.10
	<i>Cyclothone acclinidens</i>	Oceanic	0.42	0.02	0.09	4.76	0.41	0.02	0.09	4.76
	<i>Sigmops elongatus</i>	Oceanic	0.42	0.02	0.09	4.76	0.00	0.00	0.00	0.00
<b>Sternoptychidae</b>	Sternoptychidae unid.	Oceanic	0.00	0.00	0.00	0.00	2.34	0.11	0.22	23.81
	<i>Maurolicus stehmanni</i>	Oceanic	0.00	0.00	0.00	0.00	0.39	0.02	0.09	4.76
	<i>Sternoptyx</i> sp.	Oceanic	0.91	0.04	0.14	9.52	0.00	0.00	0.00	0.00
<b>Phosichthyidae</b>	Phosichthyidae unid.	Oceanic	0.42	0.02	0.09	4.76	0.00	0.00	0.00	0.00
	<i>Pollichthys maui</i>	Oceanic	0.81	0.04	0.12	9.52	0.00	0.00	0.00	0.00
	<i>Vinciguerria nimbaria</i>	Oceanic	1.40	0.07	0.17	14.29	0.35	0.02	0.08	4.76
<b>Stomiidae</b>	Stomiidae unid.	Oceanic	0.33	0.02	0.07	4.76	0.00	0.00	0.00	0.00
	<i>Chauliodus sloani</i>	Oceanic	0.00	0.00	0.00	0.00	0.29	0.01	0.06	4.76
	<i>Eustomias</i> sp.	Oceanic	0.00	0.00	0.00	0.00	0.49	0.02	0.11	4.76
	<i>Aristostomias</i> sp.	Oceanic	0.00	0.00	0.00	0.00	0.45	0.02	0.10	4.76
	Melanostomiinae	Oceanic	0.48	0.02	0.11	4.76	0.35	0.02	0.08	4.76
<b>Chlorophthalmidae</b>	<i>Chlorophthalmus agassizi</i>	Oceanic	0.86	0.04	0.14	9.52	0.29	0.01	0.06	4.76
<b>Scopelarchidae</b>	Scopelarchidae unid.	Oceanic	0.90	0.04	0.20	4.76	0.30	0.01	0.06	4.76
<b>Synodontidae</b>	Synodontidae unid.	Oceanic	3.56	0.17	0.34	23.81	1.43	0.07	0.19	14.29
	<i>Synodus synodus</i>	Oceanic	1.29	0.06	0.16	14.29	0.00	0.00	0.00	0.00
	<i>Saurida</i> sp.	Oceanic	0.40	0.02	0.09	4.76	0.30	0.01	0.06	4.76
<b>Paralepididae</b>	Paralepididae unid.	Oceanic	1.42	0.07	0.18	14.29	0.00	0.00	0.00	0.00
	<i>Lestidium atlanticum</i>	Oceanic	1.62	0.08	0.17	19.05	2.58	0.12	0.26	23.81
	<i>Lestidiops affinis</i>	Oceanic	0.00	0.00	0.00	0.00	0.46	0.02	0.10	4.76
	<i>Lestrolepis intermedia</i>	Oceanic	1.49	0.07	0.19	14.29	0.00	0.00	0.00	0.00
	<i>Sudis atrox</i>	Oceanic	0.38	0.02	0.08	4.76	0.00	0.00	0.00	0.00
	<i>Uncisudis advena</i>	Oceanic	0.30	0.01	0.07	4.76	0.32	0.02	0.07	4.76
<b>Myctophidae</b>	Myctophidae unid.	Oceanic	46.12	2.20	1.70	100.00	22.20	1.06	1.01	71.43
	<i>Diogenichthys atlanticus</i>	Oceanic	0.00	0.00	0.00	0.00	0.35	0.02	0.08	4.76
	<i>Hygophum</i> sp.	Oceanic	1.22	0.06	0.15	14.29	0.46	0.02	0.10	4.76
	<i>Hygophum reinhardtii</i>	Oceanic	0.00	0.00	0.00	0.00	0.30	0.01	0.06	4.76
	<i>Myctophum</i> sp.	Oceanic	0.92	0.04	0.14	9.52	0.39	0.02	0.09	4.76
	<i>Myctophum affine</i>	Oceanic	0.30	0.01	0.07	4.76	0.68	0.03	0.10	9.52
	<i>Myctophum obtusirostre</i>	Oceanic	5.63	0.27	0.34	42.86	2.47	0.12	0.20	28.57
	<i>Bolinichthys</i> sp.	Oceanic	0.33	0.02	0.07	4.76	0.00	0.00	0.00	0.00
	<i>Diaphus</i> sp.	Oceanic	3.58	0.17	0.24	38.10	1.02	0.05	0.16	9.52
	<i>Lampanyctus</i> sp.	Oceanic	2.66	0.13	0.28	19.05	0.96	0.05	0.11	14.29
	<i>Lampadena</i> sp.	Oceanic	0.00	0.00	0.00	0.00	0.46	0.02	0.10	4.76
	<i>Lepidophanes</i> sp.	Oceanic	1.76	0.08	0.30	9.52	0.29	0.01	0.06	4.76
	<i>Lepidophanes guentheri</i>	Oceanic	0.60	0.03	0.13	4.76	0.00	0.00	0.00	0.00

Taxon		Mesh size		330 µm			500 µm			
		Adult habitat	Total	A	SD	FO (%)	Total	A	SD	FO (%)
<b>Bregmacerotidae</b>	<i>Bregmaceros atlanticus</i>	Oceanic	1.95	0.09	0.27	14.29	0.74	0.04	0.11	9.52
	<i>Bregmaceros</i> n sp.	Oceanic	0.40	0.02	0.09	4.76	0.94	0.04	0.21	4.76
<b>Ophidiidae</b>	Ophidiidae unid.	Coastal-shelf	0.58	0.03	0.09	9.52	0.00	0.00	0.00	0.00
<b>Carapidae</b>	<i>Echiodon dawsoni</i>	Coastal-shelf	0.30	0.01	0.07	4.76	0.29	0.01	0.06	4.76
<b>Lophiiformes</b>	Lophiiformes unid.	Oceanic	0.00	0.00	0.00	0.00	0.30	0.01	0.06	4.76
<b>Exocoetidae</b>	Exocoetidae unid.	Coastal-shelf	0.35	0.02	0.08	4.76	0.45	0.02	0.10	4.76
<b>Diretmidae</b>	<i>Diretmichthys parini</i>	Oceanic	0.42	0.02	0.09	4.76	0.00	0.00	0.00	0.00
<b>Holocentridae</b>	Holocentridae unid.	Coastal-shelf	1.08	0.05	0.13	14.29	1.35	0.06	0.17	14.29
	<i>Myripristes</i> sp.	Coastal-shelf	0.42	0.02	0.09	4.76	0.35	0.02	0.08	4.76
<b>Fistulariidae</b>	<i>Fistularia tabacaria</i>	Coastal-shelf	0.30	0.01	0.07	4.76	0.00	0.00	0.00	0.00
<b>Scorpaenidae</b>	Scorpaenidae unid.	Coastal-shelf	0.00	0.00	0.00	0.00	0.88	0.04	0.19	4.76
<b>Howellidae</b>	<i>Howella</i> sp.	Oceanic	1.85	0.09	0.19	19.05	0.85	0.04	0.13	9.52
<b>Serranidae</b>	Serranidae unid.	Coastal-shelf	1.20	0.06	0.26	4.76	0.00	0.00	0.00	0.00
	<i>Serranus</i> sp.	Coastal-shelf	3.02	0.14	0.41	14.29	0.35	0.02	0.08	4.76
	<i>Dules auriga</i>	Coastal-shelf	0.00	0.00	0.00	0.00	0.64	0.03	0.14	4.76
	<i>Pseudogramma gregoryi</i>	Coastal-shelf	0.00	0.00	0.00	0.00	0.36	0.02	0.08	4.76
<b>Priacanthidae</b>	Priacanthidae unid.	Coastal-shelf	0.82	0.04	0.18	4.76	1.65	0.08	0.36	4.76
<b>Carangidae</b>	Carangidae unid.	Coastal-shelf	9.55	0.45	1.53	14.29	9.99	0.48	1.69	14.29
	<i>Caranx latus</i>	Coastal-shelf	0.00	0.00	0.00	0.00	0.34	0.02	0.07	4.76
	<i>Selar crumenophthalmus</i>	Coastal-shelf	1.20	0.06	0.26	4.76	0.32	0.02	0.07	4.76
<b>Coryphaenidae</b>	<i>Coryphaena hippurus</i>	Coastal-shelf	0.42	0.02	0.09	4.76	0.34	0.02	0.07	4.76
	<i>Coryphaena equiselis</i>	Coastal-shelf	0.00	0.00	0.00	0.00	0.34	0.02	0.07	4.76
<b>Bramidae</b>	Bramidae unid.	Oceanic	0.38	0.02	0.08	4.76	0.00	0.00	0.00	0.00
	<i>Brama dussumieri</i>	Oceanic	0.72	0.03	0.11	9.52	1.26	0.06	0.15	14.29
<b>Lutjanidae</b>	Lutjanidae unid.	Coastal-shelf	1.83	0.09	0.29	9.52	1.88	0.09	0.30	9.52
<b>Lobotidae</b>	Lobotidae unid.	Oceanic	0.60	0.03	0.13	4.76	0.96	0.05	0.21	4.76
<b>Mullidae</b>	Mullidae unid.	Coastal-shelf	0.90	0.04	0.20	4.76	0.32	0.02	0.07	4.76
<b>Chaetodontidae</b>	Chaetodontidae unid.	Coastal-shelf	0.50	0.02	0.11	4.76	0.00	0.00	0.00	0.00
<b>Pomacanthidae</b>	Pomacanthidae unid.	Coastal-shelf	0.48	0.02	0.11	4.76	0.32	0.02	0.07	4.76
<b>Pomacentridae</b>	Pomacentridae unid.	Coastal-shelf	2.87	0.14	0.23	28.57	0.85	0.04	0.13	9.52
<b>Labridae</b>	Labridae unid.	Coastal-shelf	1.45	0.07	0.19	14.29	0.75	0.04	0.11	9.52
<b>Scaridae</b>	<i>Scarus</i> sp.	Coastal-shelf	0.42	0.02	0.09	4.76	0.73	0.03	0.11	9.52
	<i>Cryptotomus roseus</i>	Coastal-shelf	0.00	0.00	0.00	0.00	1.45	0.07	0.20	14.29
	<i>Sparisoma</i> sp.	Coastal-shelf	5.72	0.27	0.29	52.38	2.34	0.11	0.21	23.81
<b>Callionymidae</b>	<i>Callionymus bairdi</i>	Coastal-shelf	5.63	0.27	0.42	38.10	2.30	0.11	0.28	19.05
<b>Gobiidae</b>	Gobiidae unid.	Coastal-shelf	25.52	1.22	3.69	47.62	15.67	0.75	2.13	47.62
<b>Microdesmidae</b>	<i>Microdesmus</i> sp.	Coastal-shelf	0.33	0.02	0.07	4.76	0.00	0.00	0.00	0.00
	<i>Ptereleotris randalli</i>	Coastal-shelf	0.00	0.00	0.00	0.00	0.41	0.02	0.09	4.76
<b>Ephippidae</b>	<i>Chaetodipterus faber</i>	Coastal-shelf	1.80	0.09	0.39	4.76	0.00	0.00	0.00	0.00
<b>Acanthuridae</b>	<i>Acanthurus</i> sp.	Coastal-shelf	3.08	0.15	0.24	33.33	4.25	0.20	0.44	28.57
<b>Sphyraenidae</b>	<i>Sphyraena</i> sp.	Oceanic	0.30	0.01	0.07	4.76	0.32	0.02	0.07	4.76
	<i>Sphyraena guachancho</i>	Oceanic	0.30	0.01	0.07	4.76	0.00	0.00	0.00	0.00



Taxon	Adult habitat	Mesh size								
		330 µm				500 µm				
		Total	A	SD	FO (%)	Total	A	SD	FO (%)	
<b>Gempylidae</b>	Gempylidae unid.	Oceanic	0.00	0.00	0.00	0.00	1.57	0.07	0.16	19.05
	<i>Gempylus serpens</i>	Oceanic	0.00	0.00	0.00	0.00	0.34	0.02	0.07	4.76
<b>Trichiuridae</b>	Trichiuridae unid.	Oceanic	0.28	0.01	0.06	4.76	0.00	0.00	0.00	0.00
<b>Scombridae</b>	Scombridae unid.	Oceanic	21.91	1.04	3.90	42.86	16.64	0.79	1.88	47.62
	<i>Auxis thazard</i>	Oceanic	0.30	0.01	0.07	4.76	0.32	0.02	0.07	4.76
	<i>Euthynnus alletteratus</i>	Oceanic	0.30	0.01	0.07	4.76	0.32	0.02	0.07	4.76
<b>Nomeidae</b>	<i>Cubiceps</i> sp.	Oceanic	5.42	0.26	0.59	23.81	4.81	0.23	0.49	28.57
	<i>Psenes</i> sp.	Oceanic	0.28	0.01	0.06	4.76	0.29	0.01	0.06	4.76
<b>Paralichthyidae</b>	Paralichthyidae unid.	Coastal-shelf	0.90	0.04	0.20	4.76	0.00	0.00	0.00	0.00
	<i>Citharichthys</i> sp.	Coastal-shelf	0.98	0.05	0.15	9.52	1.64	0.08	0.17	19.05
	<i>Syacium papillosum</i>	Coastal-shelf	14.28	0.68	1.46	47.62	7.49	0.36	0.50	47.62
<b>Bothidae</b>	<i>Bothus ocellatus</i>	Coastal-shelf	1.48	0.07	0.15	19.05	0.71	0.03	0.11	9.52
	<i>Bothus robinsi</i>	Coastal-shelf	6.80	0.32	1.03	19.05	2.88	0.14	0.21	33.33
	<i>Engyophrys senta</i>	Coastal-shelf	0.00	0.00	0.00	0.00	0.45	0.02	0.10	4.76
<b>Balistidae</b>	Balistidae unid.	Coastal-shelf	1.65	0.08	0.17	19.05	0.00	0.00	0.00	0.00
	<i>Canthidermis</i> sp.	Coastal-shelf	0.45	0.02	0.10	4.76	0.00	0.00	0.00	0.00

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