

## Supporting Information

**Table S1.** Pelagic fish assemblage of the Saint Peter and Saint Paul's Archipelago. Families are in phylogenetic order according to Nelson *et al.* (2016). Trophic groups are following Pinheiro *et al.* (2018). Relative abundance (MaxN) and mean (MMaxN;  $\pm$  standard deviation) relative abundance of the fish species.

Family / Species	Trophic group	MaxN	MMaxN
<b>Carcharhinidae</b>			
<i>Carcharhinus falciformis</i>	Carnivores	4	$0.8 \pm 1.1$
<b>Myliobatidae</b>			
<i>Mobula tarapacana</i>	Planktivores	2	$0.4 \pm 0.9$
<b>Coryphaenidae</b>			
<i>Coryphaena hippurus</i>	Carnivores	1	$0.2 \pm 0.5$
<b>Carangidae</b>			
<i>Caranx crysos</i>	Carnivores	87	$17.4 \pm 32.4$
<i>Caranx lugubris</i>	Carnivores	9	$1.8 \pm 4.0$
<i>Elagatis bipinnulata</i>	Carnivores	153	$30.6 \pm 34.9$
<i>Seriola rivoliana</i>	Carnivores	12	$2.4 \pm 3.9$
<b>Sphyraenidae</b>			
<i>Sphyraena barracuda</i>	Carnivores	4	$0.8 \pm 1.3$
<b>Scombridae</b>			
<i>Acanthocybium solandri</i>	Carnivores	10	$2.0 \pm 1.2$
<i>Thunnus albacares</i>	Carnivores	2	$0.4 \pm 0.9$
<b>Balistidae</b>			
<i>Canthidermis maculata</i>	Planktivores	35	$7.0 \pm 12.5$
<i>Canthidermis sufflamen</i>	Planktivores	27	$5.4 \pm 7.9$
<i>Melichthys niger</i>	Omnivores	100	$20.0 \pm 44.7$
<b>Monacanthidae</b>			
<i>Aluterus monoceros</i>	Omnivores	1	$0.2 \pm 0.5$

**Table S2.** Mesophotic reef fish assemblage of the Saint Peter and Saint Paul's Archipelago. Families are in phylogenetic order according to Nelson *et al.* (2016). Trophic groups are following Pinheiro *et al.* (2018). Relative abundance (MaxN) and mean (MMaxN;  $\pm$  standard deviation) relative abundance of the fish species.

Family / Species	Trophic group	MaxN	MMaxN
<b>Carcharhinidae</b>			
<i>Carcharhinus falciformis</i>	Carnivores	1	$0.07 \pm 0.27$
<i>Carcharhinus galapagensis</i>	Carnivores	1	$0.07 \pm 0.27$
<b>Myliobatidae</b>			
<i>Mobula tarapacana</i>	Planktivores	21	$1.50 \pm 5.06$
<b>Muraenidae</b>			
<i>Enchelycore nigricans</i>	Carnivores	18	$1.29 \pm 1.07$
<i>Enchelycore cf. nycturanus</i>	Carnivores	8	$0.57 \pm 0.85$
<i>Gymnothorax funebris</i>	Carnivores	8	$0.57 \pm 0.85$
<i>Muraena melanotis</i>	Carnivores	9	$0.64 \pm 0.63$
<i>Muraena pavonina</i>	Carnivores	28	$2.00 \pm 1.04$
<b>Holocentridae</b>			
<i>Holocentrus adscensionis</i>	Mobile invertebrate feeders	4	$0.29 \pm 0.61$
<i>Myripristis jacobus</i>	Planktivores	1	$0.07 \pm 0.27$
<b>Pomacentridae</b>			
<i>Chromis vanbeebberae</i>	Planktivores	123	$8.79 \pm 16.00$
<i>Azurina multilineata</i>	Planktivores	209	$14.93 \pm 17.90$

<i>Abudefduf saxatilis</i>	Omnivores	26	1.86 ± 3.23
<i>Stegastes sanctipauli</i>	Territorial herbivores	53	3.79 ± 5.63
<b>Carangidae</b>			
<i>Caranx crysos</i>	Carnivores	38	2.71 ± 10.20
<i>Carangoides bartholomaei</i>	Carnivores	4	0.29 ± 0.61
<i>Caranx lugubris</i>	Carnivores	85	6.07 ± 8.68
<i>Seriola rivoliana</i>	Carnivores	90	6.43 ± 12.10
<b>Sphyraenidae</b>			
<i>Sphyraena barracuda</i>	Carnivores	2	0.14 ± 0.36
<b>Aulostomidae</b>			
<i>Aulostomus strigosus</i>	Carnivores	10	0.71 ± 0.73
<b>Dactylopteridae</b>			
<i>Dactylopterus volitans</i>	Mobile invertebrate feeders	1	0.07 ± 0.27
<b>Labridae</b>			
<i>Bodianus insularis</i>	Mobile invertebrate feeders	18	1.29 ± 0.91
<i>Clepticus brasiliensis</i>	Planktivores	1	0.07 ± 0.27
<i>Halichoeres radiatus</i>	Mobile invertebrate feeders	22	1.57 ± 1.02
<b>Kyphosidae</b>			
<i>Kyphosus</i> sp.	Roving herbivores	17	1.21 ± 3.29
<b>Epinephelidae</b>			
<i>Cephalopholis fulva</i>	Carnivores	2	0.14 ± 0.36
<b>Serranidae</b>			
<i>Choranthias salmopunctatus</i>	Planktivores	7	0.50 ± 1.09
<i>Rypticus saponaceus</i>	Carnivores	12	0.86 ± 0.77
<b>Chaetodontidae</b>			
<i>Chaetodon striatus</i>	Sessile invertebrate feeders	4	0.29 ± 0.61
<i>Prognathodes obliquus</i>	Sessile invertebrate feeders	27	1.93 ± 2.09
<b>Pomacanthidae</b>			
<i>Holacanthus ciliaris</i>	Sessile invertebrate feeders	29	2.07 ± 1.64
<i>Pomacanthus paru</i>	Sessile invertebrate feeders	2	0.14 ± 0.36
<b>Lutjanidae</b>			
<i>Lutjanus jocu</i>	Carnivores	2	0.14 ± 0.36
<b>Balistidae</b>			
<i>Balistes capriscus</i>	Mobile invertebrate feeders	27	1.93 ± 1.73
<i>Canthidermis sufflamen</i>	Planktivores	14	1.00 ± 2.04
<i>Melichthys niger</i>	Omnivores	808	57.71 ± 23.60
<i>Xanthichthys ringens</i>	Mobile invertebrate feeders	1	0.07 ± 0.27
<b>Monacanthidae</b>			
<i>Aluterus monoceros</i>	Omnivores	8	0.57 ± 2.14
<i>Aluterus scriptus</i>	Omnivores	8	0.57 ± 0.65
<i>Cantherhines macrocerus</i>	Omnivores	24	1.71 ± 0.83
<b>Diodontidae</b>			
<i>Diodon hystrix</i>	Sessile invertebrate feeders	1	0.07 ± 0.27

**Table S3.** Generalized additive model results showing the correlations between the PCO axis 1 and 2 with depth, for the taxonomic structure (species MaxN) of the mesophotic reef fish assemblage.

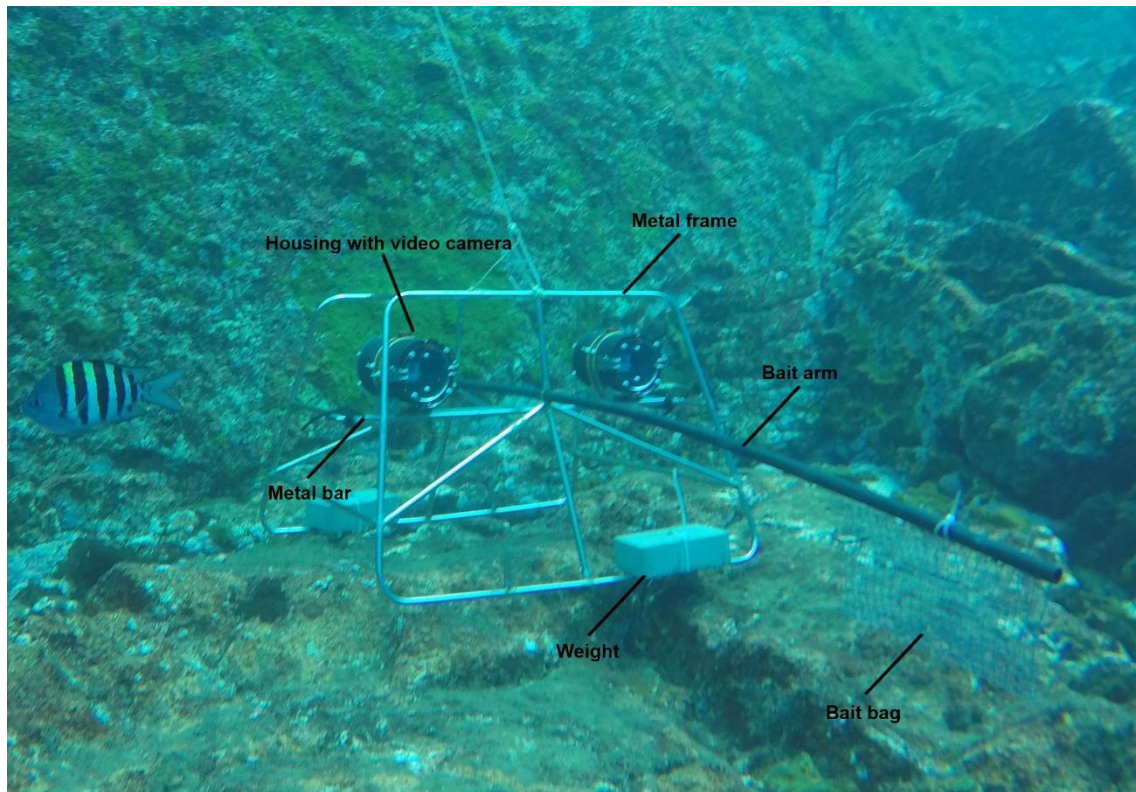
PCO1	Estimate	SE	t value	P
Intercept	0.03462	4.50094	0.008	0.994
Depth	1.763	2.181	2.49	0.127
PCO2	Estimate	SE	t value	P
Intercept	0.2975	4.0296	0.074	0.942
Depth	1	1	1.137	0.307

**Table S4.** Generalized additive model results showing the correlations between the PCO axis 1 and 2 with depth, for the trophic structure (trophic group MaxN) of the mesophotic reef fish assemblage.

PCO1	Estimate	SE	t value	P
Intercept	5.31*10 <sup>-12</sup>	3202	0	1
Depth	1.269	1.487	0.734	0.372
PCO2	Estimate	SE	t value	P
Intercept	8.429*10 <sup>-09</sup>	2404	0	1
Depth	1.903	2.353	1.004	0.509

**Table S5.** Results of the Similarity Percentage (SIMPER) analysis showing the species contributions (70% cumulative) for the pelagic, mesophotic reef and overall fish assemblages of the Saint Peter and Saint Paul's Archipelago.

Species	Average Abundance	Average Similarity	Similarity standard deviation	Contribution (%)	Cumulative contribution (%)
<b>Pelagic assemblage (Average similarity: 41.64)</b>					
<i>Elagatis bipinnulata</i>	1.99	15.41	2.54	37.00	37.00
<i>Acanthocybium solandri</i>	1.00	8.84	1.11	21.24	58.24
<i>Caranx crysos</i>	1.37	6.77	1.12	16.25	74.49
<b>Mesophotic reef assemblage (Average similarity: 58.35)</b>					
<i>Melichthys niger</i>	2.71	11.28	4.93	19.34	19.34
<i>Caranx lugubris</i>	1.42	5.42	4.82	9.29	28.63
<i>Muraena pavonina</i>	1.11	4.02	2.25	6.88	35.51
<i>Cantherhines macrocerus</i>	1.07	3.89	2.31	6.67	42.18
<i>Chromis multilineata</i>	1.41	3.60	0.96	6.18	48.36
<i>Holacanthus ciliaris</i>	1.03	3.31	1.54	5.68	54.04
<i>Halichoeres radiatus</i>	0.98	3.17	1.54	5.44	59.48
<i>Seriola rivoliana</i>	1.10	2.82	0.93	4.84	64.32
<i>Bodianus insularis</i>	0.88	2.71	1.20	4.65	68.97
<i>Balistes capriscus</i>	0.89	2.27	0.95	3.90	72.87
<b>Overall assemblage (Average similarity: 37.24)</b>					
<i>Melichthys niger</i>	2.17	7.21	1.18	19.36	19.36
<i>Caranx lugubris</i>	1.14	3.49	1.18	9.37	28.73
<i>Seriola rivoliana</i>	0.97	2.44	0.74	6.56	35.29
<i>Muraena pavonina</i>	0.82	2.14	0.89	5.74	41.03
<i>Cantherhines macrocerus</i>	0.79	2.07	0.90	5.56	46.59
<i>Chromis multilineata</i>	1.04	1.92	0.58	5.15	51.74
<i>Holacanthus ciliaris</i>	0.76	1.76	0.77	4.74	56.48
<i>Halichoeres radiatus</i>	0.72	1.69	0.77	4.54	61.02
<i>Bodianus insularis</i>	0.65	1.44	0.68	3.88	64.89
<i>Balistes capriscus</i>	0.66	1.21	0.58	3.25	68.14
<i>Enchelycore nigricans</i>	0.60	1.18	0.59	3.17	71.32



**Figure S1.** Baited remote underwater stereo-video system used in this study.