Neotropical Ichthyology

Original article

https://doi.org/10.1590/1982-0224-2021-0071

Reef fishes biodiversity and conservation at the largest Brazilian coastal Marine Protected Area (MPA Costa dos Corais)

Correspondence:
Pedro H. C. Pereira
pedrohcp2@yahoo.com.br

Pedro H. C. Pereira[1], Luís G. F. Côrtes[1,2], Gislaine V. Lima[1], Erandy Gomes[1,2,3], Antonio V. F. Pontes[1], Felipe Mattos[3], Maria E. Araújo[2,3], Flávio Ferreira-Junior[4] and Cláudio L. S. Sampaio[4]

Coral reefs harbor one of the largest fish biodiversity on earth; yet information on reef fishes is still absent for many regions. We analyzed reef fish richness, distribution, and conservation on the largest Brazilian multiple use coastal MPA; which cover a large extent of coral reefs at the SWA. A total of 325 fish species have been listed for MPA Costa dos Corais, including Chondrichthyes (28 species) and Actinopterygii (297). Fish species were represented by 81 families and the most representative families were Carangidae (23 species), Labridae (21) and Gobiidae (15). The MPA fish richness represented 44% of all recorded fish species of the Southwestern Atlantic Ocean (SWA) highlighting the large-scale importance of this MPA. A total of 40 species (12%) are registered at Near Threatened (NT), Vulnerable (VU), Endangered (EN) or Critically Endangered (CR). This study reinforces the importance of MPA Costa dos Corais on reef fish biodiversity and conservation and emphasize the urgent need of conservation strategies.

Keywords: Conservation Unit, Coral Reefs, Fish community, Ichthyofauna, Management Plan.

Submitted March 26, 2021
Accepted July 5, 2021
by Fernando Gibran
Epub December 13, 2021

1 Projeto Conservação Recifal (PCR), Rua Vigário Tenório, 194, 50030-230 Recife, PE, Brazil. (PHCP) pedrohcp2@yahoo.com.br (corresponding author), (LGFC) luisguilherme.pcr@gmail.com, (GVL) gislainevanessalima@gmail.com, (EG) erandygomes13@gmail.com, (AVFP) antoniovitor.pcr@gmail.com.

2 Departamento de Oceanografia, Universidade Federal de Pernambuco, Av. da Arquitetura, 778-822, Cidade Universitária, 50740-540 Recife, PE, Brazil. (MEA) betharau08@gmail.com.

3 Grupo de Ictiologia Marinha Tropical, Departamento de Oceanografia, Universidade Federal de Pernambuco, Av. da Arquitetura, 778-822, Cidade Universitária, 50740-540 Recife, PE, Brazil. (FM) felipemgmattos@hotmail.com.

4 Laboratório de Ictiologia e Conservação, Universidade Federal de Alagoas, Unidade Educacional Penedo, Av. Beira Rio, s/n, Centro Histórico, 57200-000 Penedo, AL, Brazil. (FFJ) flavio.junior@arapiraca.ufal.br, (CLSS) claudio.sampaio@penedo.ufal.br.

Online version ISSN 1982-0224
Print version ISSN 1679-6225

Neotrop. Ichthyol.
vol. 19, no. 4, Maringá 2021

Os recifes de coral abrigam uma das maiores biodiversidades de peixes do planeta; no entanto, as informações sobre peixes de recife ainda estão ausentes em muitas regiões. Analisamos a riqueza, distribuição e a conservação de peixes recifais na maior Área de Proteção Ambiental (APA) costeira de uso múltiplo do Brasil; área que possui grande extensão de recifes de corais no SWA. Um total de 325 espécies de peixes foram listadas para APA Costa dos Corais, incluindo Chondrichthyes (28 espécies) e Actinopterygii (297). As espécies de peixes foram representadas por 81 famílias e as famílias mais representativas foram Carangidae (23 espécies), Labridae (21) e Gobiidae (15). A riqueza de peixes da APA representou 44% de todas as espécies de peixes registradas no Oceano Atlântico Sudoeste (SWA), destacando a importância em grande escala desta APA. Um total de 40 espécies (12%) estão registradas como Quase Ameaçada (NT), Vulnerável (VU), Em Perigo (EN) ou Criticamente Em Perigo (CR). Este estudo reforça a importância da APA Costa dos Corais na biodiversidade e conservação dos peixes recifais e enfatiza a necessidade urgente de estratégias de conservação.

Palavras-chave: Comunidade de peixes, Ictiofauna, Plano de manejo, Recifes de coral, Unidade de conservação.

INTRODUCTION

Coral reefs are amongst the most relevant ecosystems on Earth with the greatest biodiversity of all marine habitats (Moberg, Folke, 1999; Adey, 2000). In addition to harbor a rich biodiversity, coral reefs are crucial both ecologically and economically, providing several services, such as fish stocks and coastal protection (Brander *et al*., 2007; Paula *et al*., 2018). The use of coral reefs, whether for tourism or fishing, is a notable attraction for the industry (Davenport, Davenport, 2006; Cowburn *et al*., 2018), raising billions of dollars annually and benefiting around 450 million people in 109 countries (Moberg, Folke, 1999; Pandolfi *et al*., 2011; Spalding *et al*., 2017).

Brazil has the unique coral reefs with many representative endemics to the southwest Atlantic Ocean (Ferreira *et al*., 2013; Leão *et al*., 2016). These ecosystems differ from reefs around the world due to the absence of natural disasters, low species richness; yet they present high endemism and high levels of sedimentation (Leão *et al*., 2003; Leão *et al*., 2016; Soares *et al*., 2021). Despite this ecological relevance, Brazilian reefs are still poorly investigated and data on biodiversity assessment of corals and reef fishes are still absent for several regions, including many Marine Protected Areas (MPAs) (Sampaio *et al*., 2016).

Reef ecosystems harbor a high diversity of fish species (Reaka-Kudla, 1997) and the close relationship of fish and reef environments has been extensively described in the last decades (see Mora, 2015 for a review). Reef fish communities are driven by multiple factors such as depth, wave exposure, latitude, and benthic structure (Gibran, Moura, 2012; Pereira *et al*., 2014; Leal *et al*., 2015; Pinheiro *et al*., 2018). However, human influence has also been currently considered one important factor affecting reef fish community and how management strategies are implemented seem to directly drive

reef fish diversity on coral reefs (Graham *et al*., 2017; Ruppert *et al*., 2018). In this scenario, the creation of MPAs along with adequate zoning process such as multiple use areas, or restricting any type of exploration, such as *no-take* zones, rises as a vital reef fish conservation strategy worldwide (Mora *et al*., 2006; Francini-Filho, Moura, 2008; Emslie *et al*., 2015; Hall *et al*., 2021).

During the last decades, the number of studies regarding reef fishes in Brazilian waters extensively increased. Many recent studies described several new fishes, from cryptic species (Smith-Vaniz *et al*., 2018; Carvalho-Filho *et al*., 2020) to large elasmobranchs (Gomes *et al*., 2000; Petean *et al*., 2020) and aimed to understand the relationship of community dynamics and environmental factors (Gibran, Moura, 2012; Pereira *et al*., 2014; Andrades *et al*., 2018; Matheus *et al*., 2019), fishing effects (Floeter *et al*., 2006; Rolim *et al*., 2019) and human induced behavior (Benevides *et al*., 2019; Pereira *et al*., 2020). In this context, Pinheiro *et al*. (2018) recently revealed a very rich reef fish fauna at Southwestern Atlantic Ocean (SWA) with a total of 733 fish species, 405 are SWA resident reef fishes, of which 111 (27%) are endemics and 78 (19%) are globally threatened.

Nevertheless, despite substantial increase in knowledge regarding reef fish systematic, ecology, biogeography and evolution on the Southwestern Atlantic (Floeter *et al*., 2008; Morais *et al*., 2017; Smith-Vaniz *et al*., 2018; Lellys *et al*., 2019; Cordeiro *et al*., 2021; Moura *et al*., 2021), several large reef areas in the SWA remained unknown and poorly studied until recently (Freitas, Lotufo, 2014; Pinheiro *et al*., 2014; Anderson *et al*., 2014 Pinheiro *et al*., 2015; Pereira *et al*., 2018; Guabiroba *et al*., 2020; Araújo *et al*., 2020). Hence, this study analyzed reef fishes biodiversity on the largest Brazilian multiple use coastal MPA and provided insights on fishes depth distribution, dispersal potential, IUCN red list categories and trophic/functional groups. Additionally, aspects of conservation and distribution of reef fishes inside MPA Costa dos Corais are also discussed.

MATERIAL AND METHODS

Study area. Marine Protect Area (MPA) "Costa dos Corais" (APACC) is the largest Brazilian coastal MPA created to protect coral reef systems on Brazilian waters. This MPA stretches from 120 km in the Northeast Brazil encompassing two states and 12 municipalities (Maida, Ferreira, 1997; Miranda *et al*., 2020) (Fig. 1). MPA Costa dos Corais covers a large range of different ecosystems such as shallow reefs, mangroves, seagrass beds, rhodolith/sponge beds and mesophotic reefs (Fig. 2) from the coast to the break of the continental shelf (Maida, Ferreira, 1997; Pereira *et al*., 2018) (Figs. 1–2).

The multiple use MPA corresponds to an IUCN category VI protected area, where sustainable use is admitted according to its management plan, published in 2013 (ICMBio, 2013). A new version of the management plan elaborated by managers in partnership with local NGOs, researchers, fishers, and touristic trade has just been published (ICMBio, 2021). APACC zoning plan is probably the best strategy to promote coral reefs conservation locally with some areas selected as "no take zones" (all human activities, except research, are prohibited), some touristic areas (only low impact visiting activities allowed) and large multiple use locations (fishing and tourists allowed).

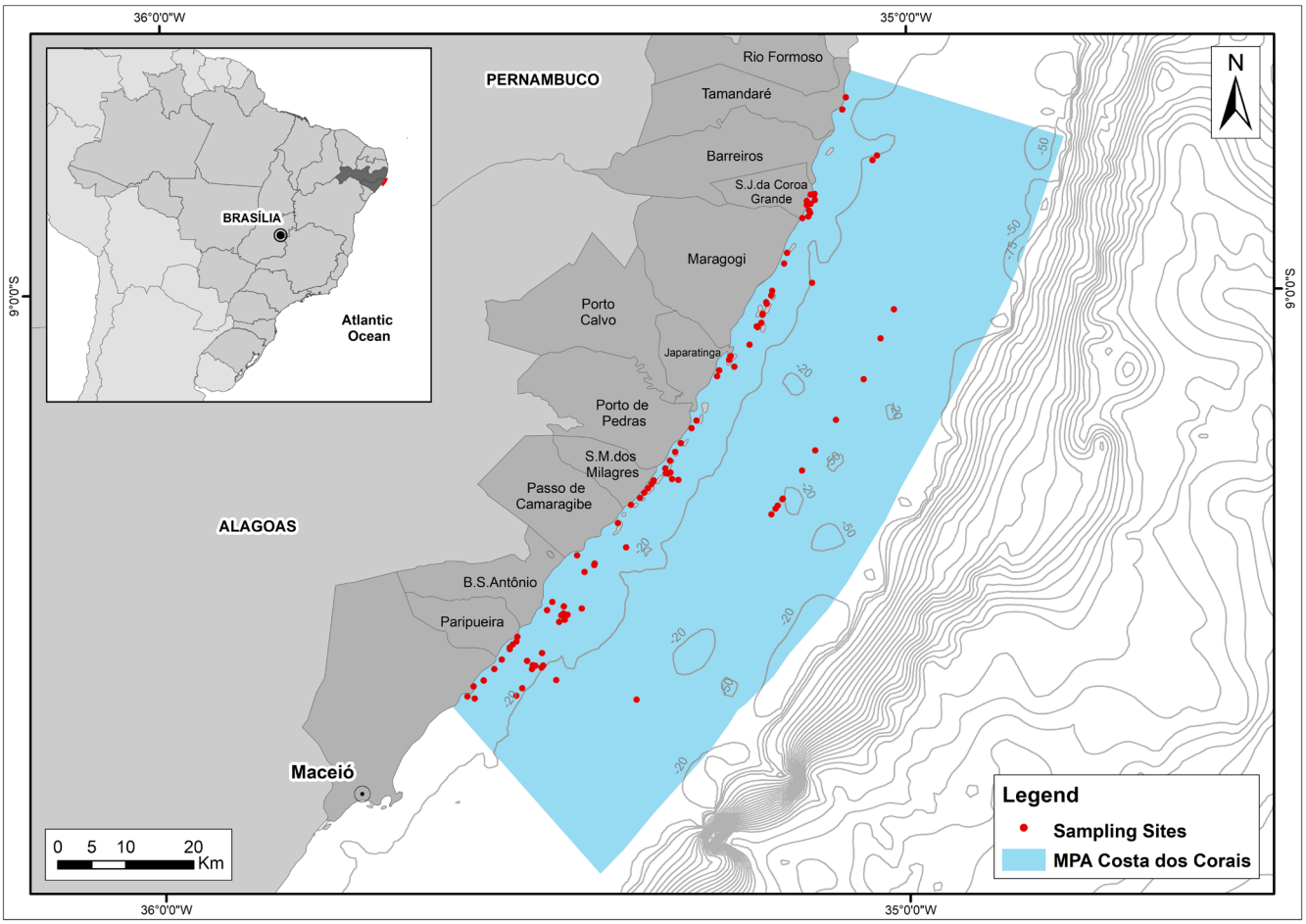


FIGURE 1 | Long-term sampling sites at Marine Protected Area (MPA) "Costa dos Corais" – South America.

Sampling design. Present study data represents a decadal field work effort (initiated in 2010) collecting reef fish information inside the MPA with multiple sampling techniques such as, remotely operated underwater vehicle (ROV), baited remote underwater video (BRUV) and scuba diving/transects. A total of 125 sampling sites distributed on MPA from 3 to 70 m depth have been investigated in more than 500 dives and 1000 belt transects (Fig. 1). Species were listed from our database (long term monitoring throughout the MPA since 2010), artisanal fisheries landing and based on literature (Pinheiro *et al*., 2018), and authors personal information. Vouchers specimens are listed in Tab. **S1**.

Species categorization. All recorded species were categorized according to depth distribution, dispersal potential, IUCN (2020) red list category, trophic and functional group as follow: **Depth distribution:** According to depth distribution species were categorize as: Very shallow (0–10 m), Shallow (10–25 m), Middle (25–50 m), Deep (50–100 m), and Very deep (> 100 m). **Dispersal potential:** Live birth, pelagic larvae/young, Demersal egg, no pelagic phase, Demersal egg, Balistid-type, demersal egg, Brooded egg, Semipelagic to Pelagic adults, Pelagic eggs and Unknown. **IUCN Red list**

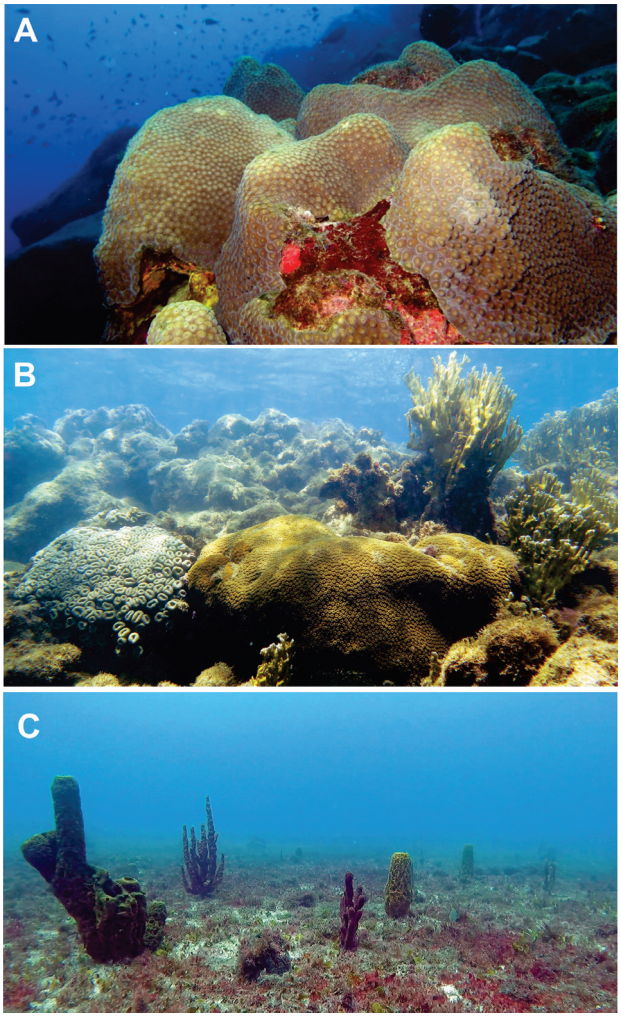


FIGURE 2 | Multiple habitats at MPA Costa dos Corais highlighting ecologically important areas for reef fishes biodiversity within the MPA. **A.** Deeper reefs (> 30 m depth) with predominance of the hard coral *Montastraea cavernosa* **B.** Shallow reefs (< 30 m depth) with dominance of hydrocoral *Millepora alcicornis* and Brazilian endemic brain coral *Mussumila hartii*. **C.** Sponge reefs with predominance of tube sponges from the genus *Aplysina*.

Categories: According to 2020 IUCN red list of threatened species, taxa are classified as: Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), and Critically Endangered (CR). **Trophic Categories:** Species were classified according to their trophic categories based on literature (Ferreira *et al*., 2004; Pinheiro *et al*., 2018) and complementary data: Macro-carnivores, Mobile benthic invertivores/cleaners, Sessile invertivores, Omnivores, Herbivore/detritivores, Piscivores and Planktivores. **Functional groups:** Species were classified according to their functional groups based on the literature (Pinheiro *et al*., 2018) and complementary data: Macro-carnivores, Strict Piscivores, Mobile benthic invertivores/cleaners, Sessile invertivores, Sand invertivores, Spongivores, Diurnal planktivores, Nocturnal planktivores, Territorial Algae/detritus, Turf grazing, Scrapers, Excavator/eroders, Macroalgae browser and General omnivores.

RESULTS

A total of 325 fish species have been listed for MPA Costa dos Corais, including Chondrichthyes (28 species) and Actinopterygii (297). This total was represented by 81 families, being the most representative: Carangidae (23 species), Labridae (21), Gobiidae (15), Haemulidae (14), Carcharhinidae (11) and Gerreidae/Ephinephelidae (10) (Tab. 1; Tab. **S1**). According to depth categories, most species inhabited Middle (120 species) and Shallow (108) areas, while the remaining categories account for 97 species altogether (Fig. 3A).

Taxa were grouped according to the dispersion potential, the most abundant categories were: Pelagic egg (205), followed by Demersal egg (40), Live birth, pelagic larvae/young (31) and Semipelagic to Pelagic adults (27) (Fig. 3B).

Considering IUCN red list categories, most of the species were classified as Least Concern (254 species), followed by Data Deficient (23) and Near Threatened (17). Species classified within threatened categories were mainly Vulnerable (15). Only eight species were Endangered (5) and Critically Endangered (3) (Fig. 3C).

For trophic groups, the most abundant category was Mobile benthic invertivores/cleaners – MINV (133 species), followed by Macro-carnivores – MCAR (107) and Planktivores (29) (Fig. 3D).

Regarding functional groups, the most abundant category was Mobile benthic invertivores/cleaners (115 species), followed by Macro-carnivores (87), Diurnal planktivores (26), Strict Piscivores/Sand invertivores (19 each) and General omnivores (18) (Fig. 3E).

TABLE 1 | Reef fishes biodiversity at the largest Brazilian coastal marine protection area (MPA Costa dos Corais). **Depth category** – VSHALL, 0–10 m; SHALL, 10–25 m; MID, 25–50 m; DEEP, 50–100 m; VDEEP, > 100 m. **Dispersal potential** - LIV: Live birth, pelagic larvae/Young; DNP: Demersal egg, no pelagic phase; DEG: Demersal egg; BAL, Balistid-type, demersal egg; BRO, Brooded egg; PAL: Semipelagic to Pelagic adults; PEL: Pelagic eggs; UK: Unknown. **IUCN category** - DD: Data deficient; LC: Least Concern; NT: Near Threatened; VU: Vulnerable; EN: Endangered; CR: Critically Endangered; NE: Not evaluated. **Trophic category** - MCAR: Macro-carnivores; MINV: Mobile benthic invertivores/cleaners; SINV: Sessile invertivores; OMNI: Omnivores; HERB: Herbivore/detritivores; PLANK: Planktivores. **Functional group** - MCAR: Macro-carnivores; PIS: Strict Piscivores; MINV: Mobile benthic invertivores/cleaners; SINV: Sessile invertivores; SAND: Sand invertivores; SPON: Spongivore; DPLA: Diurnal planktivores; NPLA: Nocturnal planktivores; THER: Territorial Algae/detritos; TRUF: Turf grazing; SCRP: Scrapers; EXCV: Excavator/eroders; MALG: Macroalgae browser; OMNI: General omnivores.

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
1	Chondrichthyes	Ginglymostomatidae	*Ginglymostoma cirratum*	(Bonnaterre, 1788)	MID	LIV	DD	MCAR	MCAR
2	Chondrichthyes	Rhincodontidae	*Rhincodon typus*	Smith, 1828	VDEEP	LIV	EN	PLANK	DPLA
3	Chondrichthyes	Triakidae	*Mustelus higmani*	Springer & Lowe, 1963	SHALL	LIV	LC	MINV	MINV
4	Chondrichthyes	Carcharhinidae	*Carcharhinus acronotus*	(Poey, 1860)	DEEP	LIV	NT	MCAR	MCAR
5	Chondrichthyes	Carcharhinidae	*Carcharhinus falciformis*	(Bibron, 1839)	VDEEP	LIV	VU	MCAR	MCAR
6	Chondrichthyes	Carcharhinidae	*Carcharhinus leucas*	(Valenciennes, 1839)	MID	LIV	NT	MCAR	MCAR
7	Chondrichthyes	Carcharhinidae	*Carcharhinus limbatus*	(Valenciennes, 1839)	VDEEP	LIV	NT	MCAR	MCAR
8	Chondrichthyes	Carcharhinidae	*Carcharhinus obscurus*	(LeSueur, 1818)	VDEEP	LIV	EN	MCAR	MCAR
9	Chondrichthyes	Carcharhinidae	*Carcharhinus perezi*	(Poey, 1876)	MID	LIV	NT	MCAR	MCAR

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
10	Chondrichthyes	Carcharhinidae	*Carcharhinus plumbeus*	(Nardo, 1827)	DEEP	LIV	VU	MCAR	MCAR
11	Chondrichthyes	Galeocerdonidae	*Galeocerdo cuvier*	(Péron & LeSueur, 1822)	DEEP	LIV	NT	MCAR	MCAR
12	Chondrichthyes	Carcharhinidae	*Negaprion brevirostris*	(Poey, 1868)	MID	LIV	NT	MCAR	MCAR
13	Chondrichthyes	Carcharhinidae	*Rhizoprionodon lalandii*	(Valenciennes, 1839)	MID	LIV	DD	MCAR	MCAR
14	Chondrichthyes	Carcharhinidae	*Rhizoprionodon porosus*	(Poey, 1861)	MID	LIV	LC	MCAR	MCAR
15	Chondrichthyes	Sphyrnidae	*Sphyrna lewini*	(Griffith & Smith, 1834)	VDEEP	LIV	CR	MCAR	MCAR
16	Chondrichthyes	Sphyrnidae	*Sphyrna mokarran*	(Rüppel, 1837)	VDEEP	LIV	CR	MCAR	MCAR
17	Chondrichthyes	Sphyrnidae	*Sphyrna tiburo*	(Linnaeus, 1758)	SHALL	LIV	LC	MCAR	MCAR
18	Chondrichthyes	Pristidae	*Pristis pristis*	(Linnaeus, 1758)	SHALL	LIV	CR	MCAR	MCAR
19	Chondrichthyes	Dasyatidae	*Hypanus berthalutzae*	Petean, Naylor & Lima, 2020	SHALL	LIV	DD	MINV	SAND
20	Chondrichthyes	Dasyatidae	*Hypanus guttatus*	(Bloch & Schneider, 1801)	SHALL	LIV	DD	MINV	SAND
21	Chondrichthyes	Dasyatidae	*Hypanus marianae*	(Gomes, Rosa & Gadig, 2000)	SHALL	LIV	DD	MINV	SAND
22	Chondrichthyes	Gymnuridae	*Gymnura micrura*	(Bloch & Schneider, 1801)	MID	LIV	DD	MINV	MINV
23	Chondrichthyes	Urotrygonidae	*Urotrygon microphthalmum*	Delsman, 1941	MID	LIV	LC	MINV	SAND
24	Chondrichthyes	Mobulidae	*Mobula birostris*	(Walbaum, 1792)	DEEP	PEL	VU	PLANK	DPLA
25	Chondrichthyes	Mobulidae	*Mobula mobular*	(Bonnaterre, 1788)	DEEP	PEL	EN	PLANK	DPLA
26	Chondrichthyes	Mobulidae	*Mobula tarapacana*	(Philippi, 1892)	DEEP	PEL	EN	PLANK	DPLA
27	Chondrichthyes	Aetobatidae	*Aetobatus narinari*	(Euprasen, 1790)	MID	LIV	NT	MCAR	SAND
28	Chondrichthyes	Rhinopteridae	*Rhinoptera bonasus*	(Mitchill, 1815)	VDEEP	LIV	NT	MINV	SAND
29	Osteichthyes	Elopidae	*Elops saurus*	Linnaeus, 1766	MID	PEL	LC	MCAR	MCAR
30	Osteichthyes	Megalopidae	*Megalops atlanticus*	Valenciennes, 1847	MID	PEL	VU	MCAR	MCAR
31	Osteichthyes	Albulidae	*Albula nemoptera*	(Fowler, 1911)	MID	PEL	DD	MINV	SAND
32	Osteichthyes	Albulidae	*Albula vulpes*	(Linnaeus, 1758)	SHALL	PEL	NT	MINV	SAND
33	Osteichthyes	Muraenidae	*Enchelycore carychroa*	Böhlke & Böhlke, 1976	MID	PEL	LC	MCAR	MCAR
34	Osteichthyes	Muraenidae	*Enchelycore nigricans*	(Bonnaterre, 1788)	SHALL	PEL	LC	MCAR	MCAR
35	Osteichthyes	Muraenidae	*Gymnothorax funebris*	Ranzani, 1839	SHALL	PEL	LC	MCAR	MCAR
36	Osteichthyes	Muraenidae	*Gymnothorax miliaris*	(Kaup, 1856)	SHALL	PEL	LC	MCAR	MCAR
37	Osteichthyes	Muraenidae	*Gymnothorax moringa*	(Cuvier, 1829)	SHALL	PEL	LC	MCAR	MCAR
38	Osteichthyes	Muraenidae	*Gymnothorax ocellatus*	Agassiz, 1831	SHALL	PEL	LC	MCAR	MCAR
39	Osteichthyes	Muraenidae	*Gymnothorax vicinus*	(Castelnau, 1855)	SHALL	PEL	LC	MCAR	MCAR
40	Osteichthyes	Muraenidae	*Muraena pavonina*	Richardson, 1845	SHALL	PEL	LC	MCAR	MCAR
41	Osteichthyes	Ophichthidae	*Ahlia egmontis*	(Jordan, 1884)	VSHALL	PEL	LC	MINV	MINV
42	Osteichthyes	Ophichthidae	*Myrichthys breviceps*	(Richardson, 1848)	VSHALL	PEL	LC	MINV	MINV
43	Osteichthyes	Ophichthidae	*Myrichthys ocellatus*	(Lesueur, 1825)	VSHALL	PEL	LC	MINV	MINV
44	Osteichthyes	Ophichthidae	*Ophichthus cylindroideus*	(Ranzani,1839)	SHALL	PEL	LC	MINV	MINV
45	Osteichthyes	Ophichthidae	*Ophichthus ophis*	(Linnaeus, 1758)	VSHALL	LIV	LC	MINV	MINV
46	Osteichthyes	Congridae	*Heteroconger camelopardalis*	(Lubbock, 1980)	MID	PEL	LC	PLANK	DPLA
47	Osteichthyes	Engraulidae	*Anchoa filifera*	(Fowler, 1915)	SHALL	PEL	LC	PLANK	DPLA
48	Osteichthyes	Engraulidae	*Anchoa januaria*	(Steindachner, 1879)	SHALL	PEL	LC	PLANK	DPLA
49	Osteichthyes	Engraulidae	*Anchoa spinifer*	(Valenciennes, 1848)	SHALL	PEL	LC	PLANK	DPLA
50	Osteichthyes	Engraulidae	*Anchoa tricolor*	(Spix & Agassiz, 1829)	SHALL	PEL	LC	PLANK	DPLA

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
51	Osteichthyes	Engraulidae	*Anchovia clupeoides*	(Swainson, 1839)	SHALL	PEL	LC	PLANK	DPLA
52	Osteichthyes	Engraulidae	*Anchoviella lepidentostole*	(Fowler, 1911)	SHALL	PEL	LC	PLANK	DPLA
53	Osteichthyes	Engraulidae	*Lycengraulis grossidens*	(Spix & Agassiz, 1829)	SHALL	PEL	LC	PLANK	DPLA
54	Osteichthyes	Ariidae	*Bagre marinus*	(Mitchill, 1815)	MID	BRO	LC	MCAR	MCAR
55	Osteichthyes	Synodontidae	*Synodus foetens*	(Linnaeus, 1766)	VSHALL	PEL	LC	MCAR	MCAR
56	Osteichthyes	Synodontidae	*Synodus intermedius*	(Spix & Agassiz, 1829)	VSHALL	PEL	LC	MCAR	MCAR
57	Osteichthyes	Synodontidae	*Synodus synodus*	(Linnaeus, 1758)	VSHALL	PEL	LC	MCAR	MCAR
58	Osteichthyes	Synodontidae	*Trachinocephalus myops*	(Forster, 1801)	MID	PEL	LC	MCAR	MCAR
59	Osteichthyes	Holocentridae	*Holocentrus adscensionis*	(Osbeck, 1765)	SHALL	PEL	LC	MINV	MINV
60	Osteichthyes	Holocentridae	*Myripristis jacobus*	Cuvier, 1829	SHALL	PEL	LC	MINV	MINV
61	Osteichthyes	Holocentridae	*Plectrypops retrospinis*	(Guichenot, 1853)	MID	PEL	LC	MINV	MINV
62	Osteichthyes	Bythitidae	*Petrotyx sanguineus*	(Meek & Hildebrand, 1928)	MID	PEL	LC	MINV	MINV
63	Osteichthyes	Batrachoididae	*Amphichthys cryptocentrus*	(Valenciennes, 1837)	SHALL	DNP	LC	MCAR	MCAR
64	Osteichthyes	Batrachoididae	*Thalassophryne nattereri*	Steindachner, 1876	SHALL	DNP	LC	MINV	MINV
65	Osteichthyes	Apogonidae	*Apogon americanus*	Castelnau, 1855	SHALL	BRO	NE	PLANK	NPLA
66	Osteichthyes	Apogonidae	*Astrapogon puncticulatus*	(Poey, 1867)	SHALL	BRO	LC	PLANK	NPLA
67	Osteichthyes	Apogonidae	*Phaeoptyx pigmentaria*	(Poey, 1860)	SHALL	BRO	LC	PLANK	NPLA
68	Osteichthyes	Eleotridae	*Eleotris pisonis*	(Gmelin, 1789)	SHALL	PEL	LC	MINV	MINV
69	Osteichthyes	Eleotridae	*Erotelis smaragdus*	(Valenciennes, 1837)	SHALL	PEL	LC	MINV	MINV
70	Osteichthyes	Gobiidae	*Barbulifer ceuthoecus*	(Jordan & Gilbert, 1884)	VSHALL	DEG	LC	MINV	MINV
71	Osteichthyes	Gobiidae	*Bathygobius geminatus*	Tornabene, Baldwin & Pezold, 2010	VSHALL	DEG	DD	MINV	MINV
72	Osteichthyes	Gobiidae	*Bathygobius soporator*	(Valenciennes, 1837)	VSHALL	DEG	LC	MINV	MINV
73	Osteichthyes	Gobiidae	*Coryphopterus dicrus*	Böhlke & Robins, 1960	VSHALL	DEG	LC	MINV	MINV
74	Osteichthyes	Gobiidae	*Coryphopterus glaucofraenum*	Gill, 1863	SHALL	DEG	LC	MINV	MINV
75	Osteichthyes	Gobiidae	*Ctenogobius boleosoma*	(Jordan & Gilbert, 1882)	SHALL	DEG	LC	MINV	MINV
76	Osteichthyes	Gobiidae	*Ctenogobius saepepallens*	(Gilbert & Randall, 1968)	VSHALL	DEG	LC	MINV	MINV
77	Osteichthyes	Gobiidae	*Elacatinus figaro*	Sazima, Moura & Rosa, 1997	MID	DEG	VU	MINV	MINV
78	Osteichthyes	Gobiidae	*Gnatholepis thompsoni*	Jordan, 1904	SHALL	DEG	LC	MINV	MINV
79	Osteichthyes	Gobiesocidae	*Gobiesox barbatulus*	Starks, 1913	VSHALL	DEG	LC	MINV	MINV
80	Osteichthyes	Gobiesocidae	*Gobiesox strumosus*	Cope, 1870	VSHALL	DEG	LC	MINV	MINV
81	Osteichthyes	Gobiidae	*Gobionellus stomatus*	Starks, 1913	SHALL	DEG	LC	MINV	MINV
82	Osteichthyes	Gobiidae	*Lythrypnus brasiliensis*	Greenfield, 1988	SHALL	DEG	NE	MINV	MINV
83	Osteichthyes	Gobiidae	*Microgobius carri*	Fowler, 1945	SHALL	DEG	LC	MINV	MINV
84	Osteichthyes	Microdesmidae	*Ptereleotris randalli*	Gasparini, Rocha & Floeter, 2001	MID	DEG	LC	PLANK	DPLA
85	Osteichthyes	Grammatidae	*Gramma brasiliensis*	Sazima, Gasparini & Moura, 1998	MID	BRO	NT	MINV	MINV
86	Osteichthyes	Pomacanthidae	*Centropyge aurantonotus*	Burgess, 1974	VDEEP	PEL	LC	HERB	THER
87	Osteichthyes	Pomacanthidae	*Holacanthus ciliaris*	(Linnaeus, 1758)	MID	PEL	LC	SINV	SPON
88	Osteichthyes	Pomacanthidae	*Holacanthus tricolor*	(Bloch, 1795)	MID	PEL	LC	SINV	SPON
89	Osteichthyes	Pomacanthidae	*Pomacanthus arcuatus*	(Linnaeus, 1758)	MID	PEL	LC	SINV	SPON
90	Osteichthyes	Pomacanthidae	*Pomacanthus paru*	(Bloch, 1787)	SHALL	PEL	LC	SINV	SPON
91	Osteichthyes	Pomacentridae	*Abudefduf saxatilis*	(Linnaeus, 1758)	SHALL	DEG	LC	OMNI	OMNI

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
92	Osteichthyes	Pomacentridae	*Chromis flavicauda*	(Günther, 1880)	VDEEP	PEL	DD	PLANK	DPLA
93	Osteichthyes	Pomacentridae	*Chromis jubauna*	Moura, 1995	VDEEP	PEL	NE	PLANK	DPLA
94	Osteichthyes	Pomacentridae	*Azurina multilineata*	(Guichenot, 1853)	SHALL	PEL	LC	PLANK	DPLA
95	Osteichthyes	Pomacentridae	*Microspathodon chrysurus*	(Cuvier, 1830)	SHALL	DEG	LC	HERB	THER
96	Osteichthyes	Pomacentridae	*Stegastes fuscus*	(Cuvier, 1830)	SHALL	DEG	LC	HERB	THER
97	Osteichthyes	Pomacentridae	*Stegastes pictus*	(Castelnau, 1855)	MID	DEG	NE	HERB	THER
98	Osteichthyes	Pomacentridae	*Stegastes variabilis*	(Castelnau, 1855)	SHALL	DEG	LC	HERB	THER
99	Osteichthyes	Mugilidae	*Mugil curema*	Valenciennes, 1836	SHALL	PEL	LC	HERB	TURF
100	Osteichthyes	Mugilidae	*Mugil curvidens*	Valenciennes, 1836	SHALL	PEL	LC	HERB	TURF
101	Osteichthyes	Mugilidae	*Mugil liza*	Valenciennes, 1836	SHALL	PEL	DD	HERB	TURF
102	Osteichthyes	Mugilidae	*Mugil rubrioculus*	Harrison, Nirchio, Oliveira, Ron & Gavíria, 2007	SHALL	PEL	LC	HERB	TURF
103	Osteichthyes	Mugilidae	*Mugil trichodon*	Poey, 1875	SHALL	PEL	LC	HERB	TURF
104	Osteichthyes	Polynemidae	*Polydactylus virginicus*	(Linnaeus, 1758)	SHALL	PEL	LC	OMNI	OMNI
105	Osteichthyes	Tripterygiidae	*Enneanectes altivelis*	Rosenblatt, 1960	SHALL	DEG	LC	MINV	MINV
106	Osteichthyes	Dactylopteridae	*Dactylopterus volitans*	(Linnaeus, 1758)	MID	BRO	LC	MINV	SAND
107	Osteichthyes	Dactyloscopidae	*Dactyloscopus foraminosus*	Dawson, 1982	SHALL	BRO	LC	MINV	SAND
108	Osteichthyes	Dactyloscopidae	*Dactyloscopus tridigitatus*	Gill, 1859	SHALL	BRO	LC	MINV	SAND
109	Osteichthyes	Dactyloscopidae	*Platygillellus brasiliensis*	Feitoza, 2002	SHALL	BRO	LC	MINV	SAND
110	Osteichthyes	Labrisomidae	*Gobioclinus kalisherae*	(Jordan, 1904)	VSHALL	DEG	LC	MINV	MINV
111	Osteichthyes	Labrisomidae	*Labrisomus cricota*	Sazima, Gasparini & Moura, 2002	VSHALL	PEL	LC	MINV	MINV
112	Osteichthyes	Labrisomidae	*Labrisomus nuchipinnis*	(Quoy & Gaimard, 1824)	VSHALL	DEG	LC	MINV	MINV
113	Osteichthyes	Labrisomidae	*Malacoctenus delalandii*	(Valenciennes, 1836)	VSHALL	DEG	LC	MINV	MINV
114	Osteichthyes	Labrisomidae	*Malacoctenus zaluari*	Carvalho-Filho, Gasparini & Sazima, 2020	VSHALL	DEG	LC	MINV	MINV
115	Osteichthyes	Labrisomidae	*Paraclinus spectator*	Guimarães & Bacelar, 2002	VSHALL	PEL	LC	MINV	MINV
116	Osteichthyes	Labrisomidae	*Starksia brasiliensis*	(Gilbert, 1900)	VSHALL	PEL	LC	MINV	MINV
117	Osteichthyes	Chaenopsidae	*Emblemariopsis signifer*	(Ginsburg, 1942)	SHALL	DEG	LC	MCAR	MCAR
118	Osteichthyes	Atherinopsidae	*Atherinella brasiliensis*	(Quoy & Gaimard, 1825)	SHALL	PEL	LC	PLANK	DPLA
119	Osteichthyes	Hemiramphidae	*Hemiramphus brasiliensis*	(Linnaeus, 1758)	SHALL	PEL	LC	OMNI	OMNI
120	Osteichthyes	Hemiramphidae	*Hyporhamphus roberti*	(Valenciennes, 1847)	SHALL	PEL	LC	MCAR	MCAR
121	Osteichthyes	Hemiramphidae	*Hyporhamphus unifasciatus*	(Ranzani, 1841)	SHALL	PEL	LC	MCAR	MCAR
122	Osteichthyes	Belonidae	*Strongylura timucu*	(Walbaum, 1792)	SHALL	PEL	LC	MCAR	MCAR
123	Osteichthyes	Belonidae	*Tylosurus acus*	(Lacepède, 1803)	MID	PEL	LC	MCAR	PISC
124	Osteichthyes	Belonidae	*Tylosurus crocodilus*	(Péron & Lesueur, 1821)	MID	PEL	LC	MCAR	PISC
125	Osteichthyes	Blenniidae	*Entomacrodus vomerinus*	(Valenciennes, 1836)	SHALL	DEG	LC	HERB	THER
126	Osteichthyes	Blenniidae	*Hypleurochilus fissicornis*	(Quoy & Gaimard, 1824)	SHALL	DEG	LC	MINV	MINV
127	Osteichthyes	Blenniidae	*Hypleurochilus aequipinnis*	(Günther, 1861)	SHALL	DEG	LC	MINV	MINV
128	Osteichthyes	Blenniidae	*Ophioblennius trinitatis*	Miranda Ribeiro, 1919	SHALL	DEG	LC	HERB	THER
129	Osteichthyes	Blenniidae	*Parablennius marmoreus*	(Poey, 1876)	SHALL	DEG	LC	OMNI	OMNI
130	Osteichthyes	Blenniidae	*Parablennius pilicornis*	(Cuvier, 1829)	SHALL	DEG	LC	OMNI	OMNI
131	Osteichthyes	Blenniidae	*Scartella cristata*	(Linnaeus, 1758)	SHALL	DEG	LC	HERB	THER

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
132	Osteichthyes	Rachycentridae	*Rachycentron canadum*	(Linnaeus, 1766)	MID	PEL	LC	MCAR	MCAR
133	Osteichthyes	Echeneidae	*Echeneis naucrates*	Linnaeus, 1758	MID	PEL	DD	MCAR	MCAR
134	Osteichthyes	Carangidae	*Alectis ciliaris*	(Bloch, 1787)	MID	PAD	LC	MCAR	MCAR
135	Osteichthyes	Carangidae	*Caranx bartholomaei*	Cuvier, 1833	MID	PAD	LC	MCAR	PISC
136	Osteichthyes	Carangidae	*Caranx ruber*	(Bloch, 1793)	DEEP	PAD	LC	MCAR	MCAR
137	Osteichthyes	Carangidae	*Caranx crysos*	(Mitchill, 1815)	MID	PAD	LC	MCAR	MCAR
138	Osteichthyes	Carangidae	*Caranx hippos*	(Linnaeus, 1766)	MID	PAD	LC	MCAR	MCAR
139	Osteichthyes	Carangidae	*Caranx latus*	Agassiz, 1831	MID	PAD	LC	MCAR	MCAR
140	Osteichthyes	Carangidae	*Caranx lugubris*	Poey, 1860	VDEEP	PAD	LC	MCAR	PISC
141	Osteichthyes	Carangidae	*Chloroscombrus chrysurus*	(Linnaeus, 1766)	MID	PAD	LC	PLANK	DPLA
142	Osteichthyes	Carangidae	*Decapterus macarellus*	(Cuvier, 1833)	MID	PAD	LC	MCAR	MCAR
143	Osteichthyes	Carangidae	*Decapterus punctatus*	(Cuvier, 1829)	MID	PAD	LC	MCAR	MCAR
144	Osteichthyes	Carangidae	*Decapterus tabl*	Berry, 1968	DEEP	PAD	LC	MCAR	MCAR
145	Osteichthyes	Carangidae	*Elagatis bipinnulata*	(Quoy & Gaimard, 1825)	DEEP	PAD	LC	MCAR	PISC
146	Osteichthyes	Carangidae	*Oligoplites saliens*	(Bloch, 1793)	MID	PAD	LC	MCAR	MCAR
147	Osteichthyes	Carangidae	*Oligoplites saurus*	(Bloch & Schneider, 1801)	MID	PAD	LC	MCAR	MCAR
148	Osteichthyes	Carangidae	*Selar crumenophthalmus*	(Bloch, 1793)	MID	PAD	LC	PLANK	DPLA
149	Osteichthyes	Carangidae	*Selene brownii*	(Cuvier, 1816)	MID	PAD	LC	MCAR	MCAR
150	Osteichthyes	Carangidae	*Selene setapinnis*	(Mitchil, 1815)	MID	PAD	LC	MCAR	MCAR
151	Osteichthyes	Carangidae	*Selene vomer*	(Linnaeus, 1758)	MID	PAD	LC	MCAR	MCAR
152	Osteichthyes	Carangidae	*Seriola dumerili*	(Risso, 1810)	DEEP	PAD	LC	MCAR	PISC
153	Osteichthyes	Carangidae	*Seriola rivoliana*	Valenciennes, 1833	VDEEP	PAD	LC	MCAR	PISC
154	Osteichthyes	Carangidae	*Trachinotus carolinus*	(Linnaeus, 1766)	MID	PAD	LC	MINV	MINV
155	Osteichthyes	Carangidae	*Trachinotus falcatus*	(Linnaeus, 1758)	MID	PAD	LC	MINV	MINV
156	Osteichthyes	Carangidae	*Trachinotus goodei*	Jordan & Evermann, 1896	VSHALL	PAD	LC	MINV	MINV
157	Osteichthyes	Sphyraenidae	*Sphyraena barracuda*	(Edwards, 1771)	MID	PEL	LC	MCAR	MCAR
158	Osteichthyes	Sphyraenidae	*Sphyraena guachancho*	Cuvier, 1829	MID	PEL	LC	MCAR	MCAR
159	Osteichthyes	Paralichthyidae	*Citharichthys arenaceus*	Evermann & Marsh, 1900	SHALL	PEL	LC	MINV	MINV
160	Osteichthyes	Paralichthyidae	*Citharichthys spilopterus*	Günther, 1862	SHALL	PEL	LC	MINV	MINV
161	Osteichthyes	Paralichthyidae	*Paralichthys brasiliensis*	(Ranzani, 1842)	SHALL	PEL	NE	MINV	MINV
162	Osteichthyes	Paralichthyidae	*Syacium micrurum*	Ranzani, 1842	SHALL	PEL	LC	MINV	MINV
163	Osteichthyes	Paralichthyidae	*Syacium papillosum*	(Linnaeus, 1758)	SHALL	PEL	LC	MINV	MINV
164	Osteichthyes	Bothidae	*Bothus lunatus*	(Linnaeus, 1758)	MID	PEL	LC	MINV	MINV
165	Osteichthyes	Bothidae	*Bothus ocellatus*	(Agassiz, 1831)	DEEP	BRO	LC	MINV	MINV
166	Osteichthyes	Achiridae	*Achirus lineatus*	(Linnaeus, 1758)	SHALL	PEL	LC	MINV	SAND
167	Osteichthyes	Achiridae	*Gymnachirus nudus*	Kaup, 1858	MID	PEL	LC	MINV	SAND
168	Osteichthyes	Cynoglossidae	*Symphurus diomedeanus*	(Goode & Bean, 1885)	MID	PEL	LC	MINV	MINV
169	Osteichthyes	Cynoglossidae	*Symphurus tessellatus*	(Quoy & Gaimard, 1824)	MID	PEL	LC	MINV	MINV
170	Osteichthyes	Syngnathidae	*Hippocampus erectus*	Perry, 1810	VSHALL	LIV	VU	MINV	MINV
171	Osteichthyes	Syngnathidae	*Hippocampus patagonicus*	Piacentino & Luzzatto, 2004	VSHALL	LIV	VU	MINV	MINV

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
172	Osteichthyes	Syngnathidae	*Hippocampus reidi*	Ginsburg, 1933	VSHALL	LIV	NT	MINV	MINV
173	Osteichthyes	Syngnathidae	*Halicampus crinitus*	(Jenyns, 1842)	VSHALL	PEL	LC	MINV	MINV
174	Osteichthyes	Syngnathidae	*Microphis lineatus*	(Kaup, 1856)	VSHALL	PEL	DD	MINV	MINV
175	Osteichthyes	Syngnathidae	*Syngnathus pelagicus*	Linnaeus, 1758	VSHALL	PEL	LC	MINV	MINV
176	Osteichthyes	Aulostomidae	*Aulostomus strigosus*	Wheeler, 1955	MID	BAL	LC	MCAR	PISC
177	Osteichthyes	Fistulariidae	*Fistularia tabacaria*	Linnaeus, 1758	SHALL	DEG	LC	MCAR	PISC
178	Osteichthyes	Trichiuridae	*Trichiurus lepturus*	Linnaeus, 1758	MID	PEL	LC	MCAR	MCAR
179	Osteichthyes	Scombridae	*Acanthocybium solandri*	(Cuvier, 1832)	VDEEP	PEL	LC	MCAR	PISC
180	Osteichthyes	Scombridae	*Auxis thazard*	(Lacepède, 1800)	MID	PAD	LC	MCAR	MCAR
181	Osteichthyes	Scombridae	*Euthynnus alletteratus*	(Rafinesque, 1810)	MID	PAD	LC	MCAR	MCAR
182	Osteichthyes	Scombridae	*Scomberomorus brasiliensis*	Collette, Russo & Zavala-Camin, 1978	MID	PEL	LC	MCAR	PISC
183	Osteichthyes	Scombridae	*Scomberomorus cavalla*	(Cuvier, 1829)	MID	PEL	LC	MCAR	PISC
184	Osteichthyes	Scombridae	*Scomberomorus regalis*	(Bloch, 1793)	MID	PEL	LC	MCAR	PISC
185	Osteichthyes	Scombridae	*Thunnus albacares*	(Bonnaterre, 1788)	VDEEP	PEL	NT	MCAR	PISC
186	Osteichthyes	Scombridae	*Thunnus atlanticus*	(Lesson, 1831)	VDEEP	PEL	LC	MCAR	PISC
187	Osteichthyes	Scombridae	*Thunnus obesus*	(Lowe, 1839)	VDEEP	PEL	VU	MCAR	PISC
188	Osteichthyes	Labridae	*Bodianus pulchellus*	(Poey, 1860)	VDEEP	PEL	LC	MINV	MINV
189	Osteichthyes	Labridae	*Bodianus rufus*	(Linnaeus, 1758)	MID	PEL	LC	MINV	MINV
190	Osteichthyes	Labridae	*Clepticus brasiliensis*	Heiser, Moura & Robertson, 2000	DEEP	PEL	LC	PLANK	DPLA
191	Osteichthyes	Labridae	*Doratonotus megalepis*	Günther, 1862	SHALL	PEL	LC	MINV	MINV
192	Osteichthyes	Labridae	*Halichoeres bivittatus*	(Bloch, 1791)	MID	PEL	LC	MINV	MINV
193	Osteichthyes	Labridae	*Halichoeres brasiliensis*	(Bloch, 1791)	SHALL	PEL	DD	MINV	MINV
194	Osteichthyes	Labridae	*Halichoeres dimidiatus*	(Agassiz, 1831)	MID	PEL	LC	MINV	MINV
195	Osteichthyes	Labridae	*Halichoeres penrosei*	Starks, 1913	SHALL	PEL	LC	MINV	MINV
196	Osteichthyes	Labridae	*Halichoeres poeyi*	(Steindachner, 1867)	SHALL	DEG	LC	MINV	MINV
197	Osteichthyes	Labridae	*Lachnolaimus maximus*	(Walbaum, 1792)	SHALL	PEL	VU	MINV	MINV
198	Osteichthyes	Labridae	*Thalassoma noronhanum*	(Boulenger, 1890)	SHALL	PEL	LC	PLANK	DPLA
199	Osteichthyes	Labridae	*Xyrichtys novacula*	(Linnaeus, 1758)	MID	PEL	LC	MINV	MINV
200	Osteichthyes	Labridae	*Xyrichtys splendens*	Castelnau, 1855	MID	PEL	LC	MINV	MINV
201	Osteichthyes	Scaridae	*Cryptotomus roseus*	Cope, 1871	SHALL	DEG	LC	HERB	SCRP
202	Osteichthyes	Scaridae	*Nicholsina usta*	(Valenciennes, 1840)	SHALL	DEG	LC	HERB	EXCV
203	Osteichthyes	Scaridae	*Scarus trispinosus*	Valenciennes, 1840	MID	DEG	EN	HERB	EXCV
204	Osteichthyes	Scaridae	*Scarus zelindae*	Moura, Figueiredo & Sazima, 2001	MID	PEL	DD	HERB	SCRP
205	Osteichthyes	Scaridae	*Sparisoma amplum*	(Ranzani, 1841)	MID	PEL	LC	HERB	SCRP
206	Osteichthyes	Scaridae	*Sparisoma axillare*	(Steindachner, 1878)	MID	PEL	DD	HERB	SCRP
207	Osteichthyes	Scaridae	*Sparisoma frondosum*	(Agassiz, 1831)	MID	PEL	DD	HERB	SCRP
208	Osteichthyes	Scaridae	*Sparisoma radians*	(Valenciennes, 1840)	SHALL	PEL	LC	HERB	MALG
209	Osteichthyes	Centropomidae	*Centropomus parallelus*	Poey, 1860	SHALL	PEL	LC	MCAR	MCAR
210	Osteichthyes	Centropomidae	*Centropomus undecimalis*	(Bloch, 1792)	SHALL	PEL	LC	MCAR	MCAR
211	Osteichthyes	Centropomidae	*Centropomus pectinatus*	Poey, 1860	SHALL	PEL	LC	MCAR	MCAR
212	Osteichthyes	Gerreidae	*Diapterus auratus*	Ranzani, 1842	VSHALL	PEL	LC	MINV	MINV

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
213	Osteichthyes	Gerreidae	*Diapterus rhombeus*	(Cuvier, 1829)	VSHALL	PEL	LC	MINV	MINV
214	Osteichthyes	Gerreidae	*Eucinostomus argenteus*	Baird & Girard, 1855	VSHALL	PEL	LC	MINV	MINV
215	Osteichthyes	Gerreidae	*Eucinostomus gula*	(Quoy & Gaimard, 1824)	VSHALL	PEL	LC	MINV	MINV
216	Osteichthyes	Gerreidae	*Eucinostomus havana*	(Nichols, 1912)	VSHALL	PEL	LC	MINV	MINV
217	Osteichthyes	Gerreidae	*Eucinostomus lefroyi*	(Goode, 1874)	VSHALL	PEL	LC	MINV	MINV
218	Osteichthyes	Gerreidae	*Eucinostomus melanopterus*	(Bleeker, 1863)	VSHALL	PEL	LC	MINV	MINV
219	Osteichthyes	Gerreidae	*Eugerres brasilianus*	(Cuvier, 1830)	VSHALL	PEL	LC	MINV	MINV
220	Osteichthyes	Gerreidae	*Gerres cinereus*	(Walbaum, 1792)	VSHALL	PEL	LC	MINV	MINV
221	Osteichthyes	Gerreidae	*Ulaema lefroyi*	(Goode, 1874)	VSHALL	PEL	LC	MINV	MINV
222	Osteichthyes	Mullidae	*Mulloidichthys martinicus*	(Cuvier, 1829)	MID	PEL	LC	MINV	SAND
223	Osteichthyes	Mullidae	*Pseudupeneus maculatus*	(Bloch, 1793)	MID	PEL	LC	MINV	SAND
224	Osteichthyes	Mullidae	*Upeneus parvus*	Poey, 1852	VDEEP	PEL	LC	MINV	SAND
225	Osteichthyes	Pempheridae	*Pempheris schomburgkii*	Müller & Troschel, 1848	SHALL	PEL	LC	PLANK	DPLA
226	Osteichthyes	Clupeidae	*Harengula clupeola*	(Cuvier, 1829)	SHALL	PEL	LC	PLANK	DPLA
227	Osteichthyes	Clupeidae	*Lile piquitinga*	(Schreiner & Miranda Ribeiro, 1903)	SHALL	PEL	LC	PLANK	DPLA
228	Osteichthyes	Clupeidae	*Opisthonema oglinum*	(Lesueur, 1818)	SHALL	PEL	LC	PLANK	DPLA
229	Osteichthyes	Kyphosidae	*Kyphosus sectatrix*	(Linnaeus, 1758)	MID	PEL	LC	HERB	MALG
230	Osteichthyes	Serranidae	*Alphestes afer*	(Bloch, 1793)	SHALL	PEL	LC	MCAR	MCAR
231	Osteichthyes	Serranidae	*Cephalopholis fulva*	(Linnaeus, 1758)	MID	PEL	LC	MCAR	MCAR
232	Osteichthyes	Serranidae	*Epinephelus adscensionis*	(Osbeck, 1765)	MID	PEL	LC	MCAR	MCAR
233	Osteichthyes	Serranidae	*Epinephelus itajara*	(Lichtenstein, 1822)	DEEP	PEL	VU	MCAR	MCAR
234	Osteichthyes	Serranidae	*Epinephelus morio*	(Valenciennes, 1828)	VDEEP	PEL	VU	MCAR	MCAR
235	Osteichthyes	Serranidae	*Gonioplectrus hispanus*	(Cuvier, 1828)	VDEEP	PEL	LC	MCAR	MCAR
236	Osteichthyes	Serranidae	*Hyporthodus niveatus*	(Valenciennes, 1828)	VDEEP	PEL	VU	MCAR	MCAR
237	Osteichthyes	Serranidae	*Mycteroperca bonaci*	(Poey, 1860)	DEEP	DEG	NT	MCAR	PISC
238	Osteichthyes	Serranidae	*Mycteroperca interstitialis*	(Poey, 1860)	VDEEP	PAD	VU	MCAR	PISC
239	Osteichthyes	Serranidae	*Mycteroperca venenosa*	(Linnaeus, 1758)	VDEEP	PAD	NT	MCAR	PISC
240	Osteichthyes	Serranidae	*Paranthias furcifer*	(Valenciennes, 1828)	MID	PEL	LC	PLANK	DPLA
241	Osteichthyes	Serranidae	*Dermatolepis inermis*	(Valenciennes, 1833)	VDEEP	PEL	DD	MCAR	MCAR
242	Osteichthyes	Serranidae	*Diplectrum formosum*	(Linnaeus, 1766)	MID	PEL	LC	MCAR	MCAR
243	Osteichthyes	Serranidae	*Diplectrum radiale*	(Quoy & Gaimard, 1824)	MID	PEL	LC	MCAR	MCAR
244	Osteichthyes	Serranidae	*Rypticus bistrispinus*	(Mitchill, 1818)	VSHALL	PEL	LC	MINV	MINV
245	Osteichthyes	Serranidae	*Rypticus saponaceus*	(Bloch & Schneider, 1801)	VSHALL	PEL	LC	MINV	MINV
246	Osteichthyes	Serranidae	*Rypticus subbifrenatus*	Gill, 1861	VSHALL	PEL	LC	MINV	MINV
247	Osteichthyes	Serranidae	*Serranus baldwini*	(Evermann & Marsch, 1899)	VSHALL	PEL	LC	MINV	MINV
248	Osteichthyes	Serranidae	*Serranus flaviventris*	(Cuvier, 1829)	VSHALL	PEL	LC	MINV	MINV
249	Osteichthyes	Priacanthidae	*Heteropriacanthus cruentatus*	(Lacepède, 1801)	MID	PEL	LC	MINV	MINV
250	Osteichthyes	Priacanthidae	*Priacanthus arenatus*	Cuvier, 1829	MID	PEL	LC	MINV	MINV
251	Osteichthyes	Chaetodontidae	*Chaetodon ocellatus*	Bloch, 1787	MID	PEL	LC	SINV	SINV
252	Osteichthyes	Chaetodontidae	*Chaetodon sedentarius*	Poey, 1860	MID	PEL	LC	SINV	SINV

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
253	Osteichthyes	Chaetodontidae	*Chaetodon striatus*	Linnaeus, 1758	MID	PEL	LC	SINV	SINV
254	Osteichthyes	Malacanthidae	*Malacanthus plumieri*	(Bloch, 1786)	MID	LIV	LC	MCAR	MCAR
255	Osteichthyes	Haemulidae	*Paranisotremus moricandi*	(Ranzani, 1842)	MID	PEL	LC	MINV	MINV
256	Osteichthyes	Haemulidae	*Anisotremus surinamensis*	(Bloch, 1791)	MID	PEL	DD	MINV	MINV
257	Osteichthyes	Haemulidae	*Anisotremus virginicus*	(Linnaeus, 1758)	MID	PEL	LC	MINV	MINV
258	Osteichthyes	Haemulidae	*Conodon nobilis*	(Linnaeus, 1758)	MID	PEL	LC	MINV	MINV
259	Osteichthyes	Haemulidae	*Genyatremus luteus*	(Bloch, 1790)	SHALL	PEL	DD	MINV	MINV
260	Osteichthyes	Haemulidae	*Haemulon aurolineatum*	Cuvier, 1830	MID	PEL	LC	MINV	MINV
261	Osteichthyes	Haemulidae	*Haemulon parra*	(Desmarest, 1823)	MID	PEL	LC	MINV	MINV
262	Osteichthyes	Haemulidae	*Haemulon melanurum*	(Linnaeus, 1758)	DEEP	PEL	LC	MINV	MINV
263	Osteichthyes	Haemulidae	*Haemulon plumieri*	(Lacepède, 1801)	DEEP	PEL	LC	MINV	MINV
264	Osteichthyes	Haemulidae	*Haemulon squamipinna*	Rocha & Rosa, 1999	MID	PEL	NE	MINV	MINV
265	Osteichthyes	Haemulidae	*Haemulon atlanticus*	Carvalho, Marceniuk, Oliveira & Wosiacki, 2020	MID	PEL	LC	MINV	MINV
266	Osteichthyes	Haemulidae	*Orthopristis scapularis*	Fowler, 1915	MID	PEL	LC	MINV	MINV
267	Osteichthyes	Haemulidae	*Pomadasys ramosus*	(Poey, 1860)	SHALL	PEL	NE	OMNI	OMNI
268	Osteichthyes	Haemulidae	*Haemulopsis corvinaeformis*	(Steindachner, 1868)	MID	PEL	LC	OMNI	OMNI
269	Osteichthyes	Lutjanidae	*Etelis oculatus*	(Valenciennes, 1828)	VDEEP	PEL	DD	MCAR	MCAR
270	Osteichthyes	Lutjanidae	*Lutjanus alexandrei*	Moura & Lindeman, 2007	MID	PEL	NE	MCAR	MCAR
271	Osteichthyes	Lutjanidae	*Lutjanus analis*	(Cuvier, 1828)	MID	PEL	NT	MCAR	MCAR
272	Osteichthyes	Lutjanidae	*Lutjanus buccanella*	(Cuvier, 1828)	VDEEP	PEL	DD	MCAR	MCAR
273	Osteichthyes	Lutjanidae	*Lutjanus cyanopterus*	(Cuvier, 1828)	MID	PEL	VU	MCAR	MCAR
274	Osteichthyes	Lutjanidae	*Lutjanus jocu*	(Bloch & Schneider, 1801)	MID	PEL	DD	MCAR	MCAR
275	Osteichthyes	Lutjanidae	*Lutjanus synagris*	(Linnaeus, 1758)	MID	PEL	NT	MCAR	MCAR
276	Osteichthyes	Lutjanidae	*Lutjanus vivanus*	(Cuvier, 1828)	VDEEP	PEL	LC	MCAR	MCAR
277	Osteichthyes	Lutjanidae	*Ocyurus chrysurus*	(Bloch, 1791)	MID	PEL	DD	MCAR	MCAR
278	Osteichthyes	Lutjanidae	*Rhomboplites aurorubens*	(Cuvier, 1829)	MID	LIV	VU	MCAR	MCAR
279	Osteichthyes	Cirrhitidae	*Amblycirrhitus pinos*	(Mowbray, 1927)	MID	PEL	LC	MINV	MINV
280	Osteichthyes	Scorpaenidae	*Scorpaena brasiliensis*	Cuvier, 1829	DEEP	PEL	LC	MCAR	MCAR
281	Osteichthyes	Scorpaenidae	*Scorpaena inermis*	Cuvier, 1829	DEEP	PEL	LC	MCAR	MCAR
282	Osteichthyes	Scorpaenidae	*Scorpaena plumieri*	Bloch, 1789	SHALL	PEL	LC	MCAR	MCAR
283	Osteichthyes	Scorpaenidae	*Scorpaenodes caribbaeus*	Meek & Hildebrand, 1928	SHALL	PEL	LC	MCAR	MCAR
284	Osteichthyes	Triglidae	*Prionotus punctatus*	(Bloch, 1793)	MID	PEL	LC	MINV	MINV
285	Osteichthyes	Ephippidae	*Chaetodipterus faber*	(Broussonet, 1782)	MID	PEL	LC	MINV	MINV
286	Osteichthyes	Sciaenidae	*Bairdiella ronchus*	(Cuvier, 1830)	SHALL	PEL	LC	MINV	SAND
287	Osteichthyes	Sciaenidae	*Cynoscion leiarchus*	(Cuvier, 1830)	SHALL	PEL	LC	MINV	SAND
288	Osteichthyes	Sciaenidae	*Eques lanceolatus*	(Linnaeus, 1758)	VDEEP	PEL	LC	MINV	MINV
289	Osteichthyes	Sciaenidae	*Larimus breviceps*	Cuvier, 1830	MID	PEL	LC	MINV	MINV
290	Osteichthyes	Sciaenidae	*Menticirrhus americanus*	(Linnaeus, 1758)	MID	PEL	LC	MINV	MINV
291	Osteichthyes	Sciaenidae	*Menticirrhus martinicensis*	(Cuvier, 1830)	MID	PEL	LC	MINV	MINV

TABLE 1 | (Continued)

Number	Group	Family	Species	Authorship	Depth category	Dispersal potential	IUCN category	Trophic category	Functional group
292	Osteichthyes	Sciaenidae	*Menticirrhus cuiaranensis*	Marceniuk, Caires, Rotundo, Cerqueira, Siccha-Ramirez, Wosiacki & Oliveira, 2020	MID	PEL	LC	MINV	MINV
293	Osteichthyes	Sciaenidae	*Odontoscion dentex*	(Cuvier, 1830)	MID	PEL	LC	MCAR	MCAR
294	Osteichthyes	Sciaenidae	*Pareques acuminatus*	(Bloch & Schneider, 1801)	SHALL	PEL	LC	MINV	MINV
295	Osteichthyes	Acanthuridae	*Acanthurus bahianus*	Castelnau, 1855	SHALL	PEL	LC	HERB	TURF
296	Osteichthyes	Acanthuridae	*Acanthurus chirurgus*	(Bloch, 1787)	SHALL	PEL	LC	HERB	TURF
297	Osteichthyes	Acanthuridae	*Acanthurus coeruleus*	Bloch & Schneider, 1801	SHALL	PEL	LC	HERB	TURF
298	Osteichthyes	Lobotidae	*Lobotes surinamensis*	(Bloch, 1790)	MID	PEL	LC	MCAR	MCAR
299	Osteichthyes	Sparidae	*Archosargus probatocephalus*	(Walbaum, 1792)	VSHALL	PEL	LC	HERB	MALG
300	Osteichthyes	Sparidae	*Archosargus rhomboidalis*	(Linnaeus, 1758)	VSHALL	PEL	LC	HERB	MALG
301	Osteichthyes	Sparidae	*Calamus penna*	(Valenciennes, 1830)	MID	PEL	LC	MINV	MINV
302	Osteichthyes	Sparidae	*Calamus pennatula*	Guichenot, 1868	MID	PEL	LC	MINV	MINV
303	Osteichthyes	Antennariidae	*Antennarius striatus*	(Shaw, 1794)	SHALL	PEL	LC	MCAR	MCAR
304	Osteichthyes	Ogcocephalidae	*Ogcocephalus vespertilio*	(Linnaeus, 1758)	SHALL	UNK	LC	MINV	MINV
305	Osteichthyes	Ostraciidae	*Acanthostracion quadricornis*	(Linnaeus, 1758)	MID	BAL	LC	OMNI	OMNI
306	Osteichthyes	Ostraciidae	*Acanthostracion polygonius*	Poey, 1876	MID	BAL	LC	OMNI	OMNI
307	Osteichthyes	Ostraciidae	*Lactophrys trigonus*	(Linnaeus, 1758)	MID	BAL	LC	OMNI	OMNI
308	Osteichthyes	Monacanthidae	*Aluterus heudelotii*	Hollard, 1855	MID	BAL	LC	OMNI	OMNI
309	Osteichthyes	Monacanthidae	*Aluterus scriptus*	(Osbeck, 1765)	MID	BAL	LC	OMNI	OMNI
310	Osteichthyes	Balistidae	*Balistes vetula*	Linnaeus, 1758	MID	BAL	NT	MINV	MINV
311	Osteichthyes	Balistidae	*Canthidermis sufflamen*	(Mitchill, 1815)	DEEP	BAL	LC	OMNI	OMNI
312	Osteichthyes	Balistidae	*Melichthys niger*	(Bloch, 1786)	DEEP	PEL	LC	OMNI	OMNI
313	Osteichthyes	Monacanthidae	*Cantherhines macrocerus*	(Hollard, 1853)	MID	DEG	LC	OMNI	OMNI
314	Osteichthyes	Monacanthidae	*Cantherhines pullus*	(Ranzani, 1842)	SHALL	PEL	LC	OMNI	OMNI
315	Osteichthyes	Monacanthidae	*Stephanolepis hispida*	(Linnaeus, 1766)	SHALL	PEL	LC	OMNI	OMNI
316	Osteichthyes	Tetraodontidae	*Canthigaster figueiredoi*	Moura & Castro, 2002	VSHALL	BAL	LC	OMNI	OMNI
317	Osteichthyes	Tetraodontidae	*Colomesus psittacus*	(Bloch & Schneider, 1801)	MID	PEL	LC	MINV	MINV
318	Osteichthyes	Tetraodontidae	*Lagocephalus laevigatus*	(Linnaeus, 1766)	MID	PEL	LC	MINV	MINV
319	Osteichthyes	Tetraodontidae	*Sphoeroides greeleyi*	Gilbert, 1900	VSHALL	PEL	LC	MINV	MINV
320	Osteichthyes	Tetraodontidae	*Sphoeroides spengleri*	(Bloch, 1785)	VSHALL	PEL	LC	MINV	MINV
321	Osteichthyes	Tetraodontidae	*Sphoeroides testudineus*	(Linnaeus, 1758)	VSHALL	PEL	LC	MINV	MINV
322	Osteichthyes	Diodontidae	*Chilomycterus antillarum*	Jordan & Rutter, 1897	SHALL	PEL	LC	SINV	SINV
323	Osteichthyes	Diodontidae	*Chilomycterus spinosus*	(Linnaeus, 1758)	SHALL	PEL	LC	SINV	SINV
324	Osteichthyes	Diodontidae	*Diodon holocanthus*	Linnaeus, 1758	SHALL	PEL	LC	SINV	SINV
325	Osteichthyes	Diodontidae	*Diodon hystrix*	Linnaeus, 1758	SHALL	PEL	LC	SINV	SINV

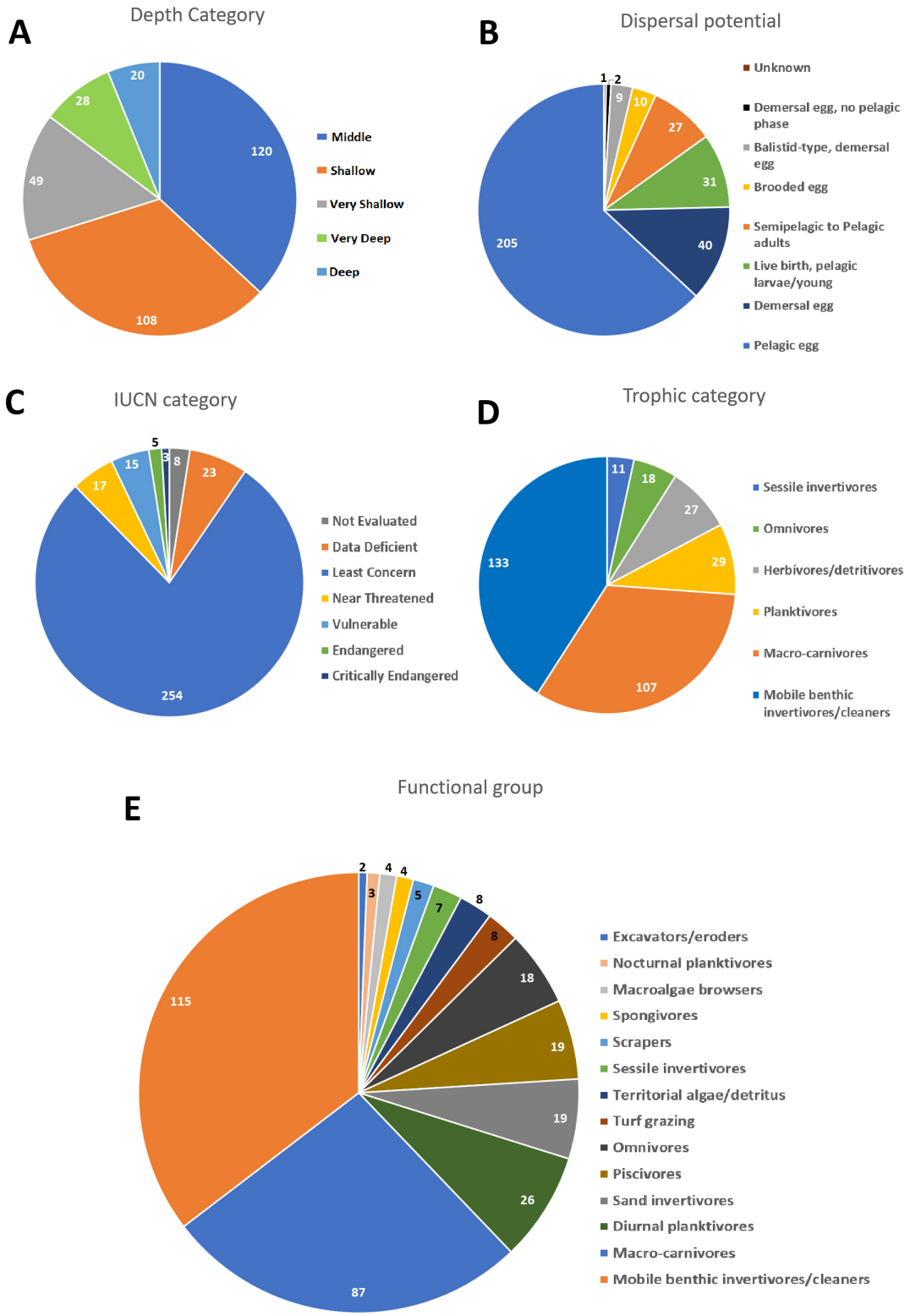


FIGURE 3 | Marine Protected Area (MPA) "Costa dos Corais" fishes biodiversity grouped in categories (see "Species categorization" in Material and Methods section and Tab. 1). **A.** Depth category. **B.** Dispersal potential. **C.** IUCN category. **D.** Trophic category. **E.** Functional group.

DISCUSSION

Our checklist encompassed a total of 325 reef fish species at MPA Costa dos Corais. Pinheiro *et al.* (2018) recently compiled reef fish fauna at Southwestern Atlantic Ocean (SWA) with a total of 733 fish species. Our data represents 44% of all the SWA fish biodiversity inside the MPA territory. We highlight the vital large-scale significance of the largest Brazilian coastal MPA as one of the richest reef fish community on the SWA and reinforce the importance of this MPA on reef fish biodiversity and conservation. Additionally, we emphasize the importance of large scale and long-term surveys analyzing reef fish community compositions inside Brazilian MPAs. Initiatives as the present study, which often demonstrate unprecedented rich communities in otherwise poorly assessed and underestimated areas, are vital to enhance the effectiveness of MPAs acting as milestones for species monitoring and conservation (Figs. 4–13).

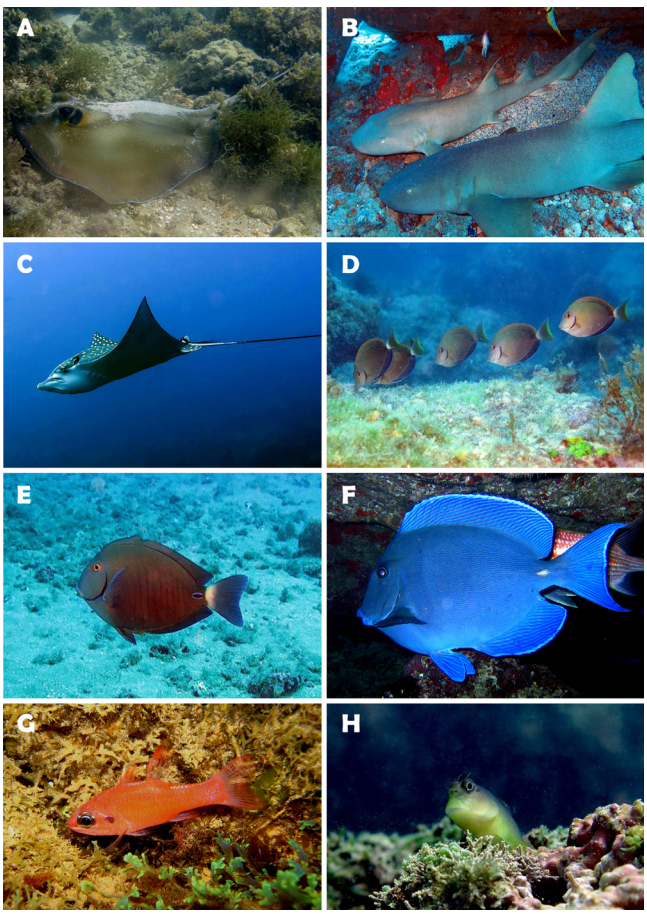


FIGURE 4 | Fish biodiversity from MPA Costa dos Corais. **A.** *Hypanus marianae* (35 cm of total length, TL. **B.** *Ginglymostoma cirratum* (~ 110 cm TL). **C.** *Aetobatus narinari* (~ 80 cm TL). **D.** *Acanthurus bahianus* (~ 15 cm TL). **E.** *Acanthurus chirurgus* (~ 20 cm TL). **F.** *Acanthurus coeruleus* (~ 30 cm TL). **G.** *Apogon americanus* (~ 5 cm TL). **H.** *Ophioblennius trinitatis* (~ 5 cm TL).

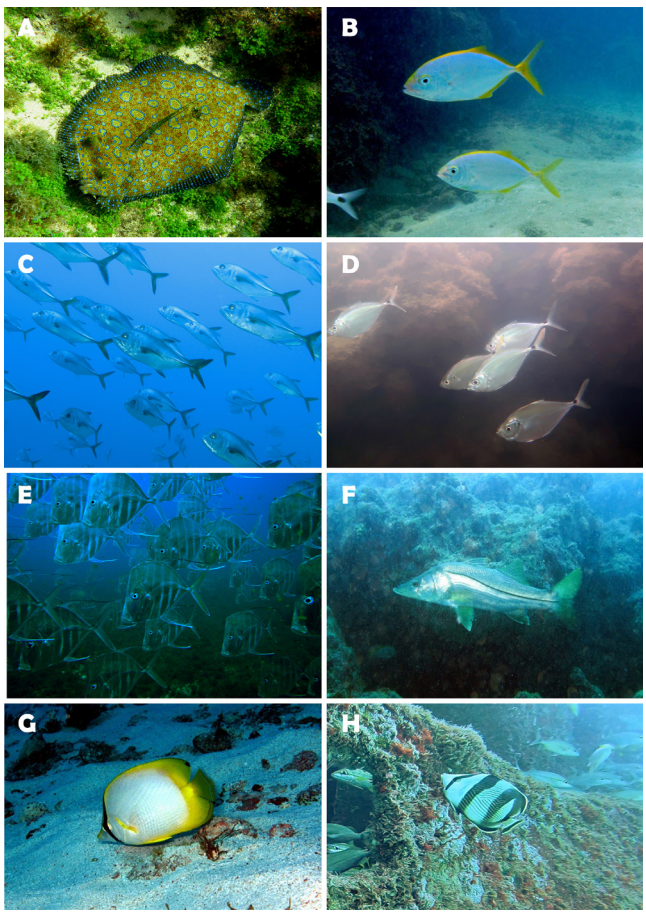


FIGURE 5 | Fish biodiversity from MPA Costa dos Corais. **A.** *Bothus lunatus* (~ 20 cm TL). **B.** *Caranx bartholomaei* (~ 20 cm TL). **C.** *Caranx latus* (~ 40 cm TL). **D.** *Chloroscombrus chrysurus* (~ 10 cm TL). **E.** *Selene vomer* (~ 25 cm TL). **F.** *Centropomus undecimalis* (~ 50 cm TL). **G.** *Chaetodon ocellatus* (~ 5 cm TL). **H.** *Chaetodon striatus* (~ 5 cm TL).

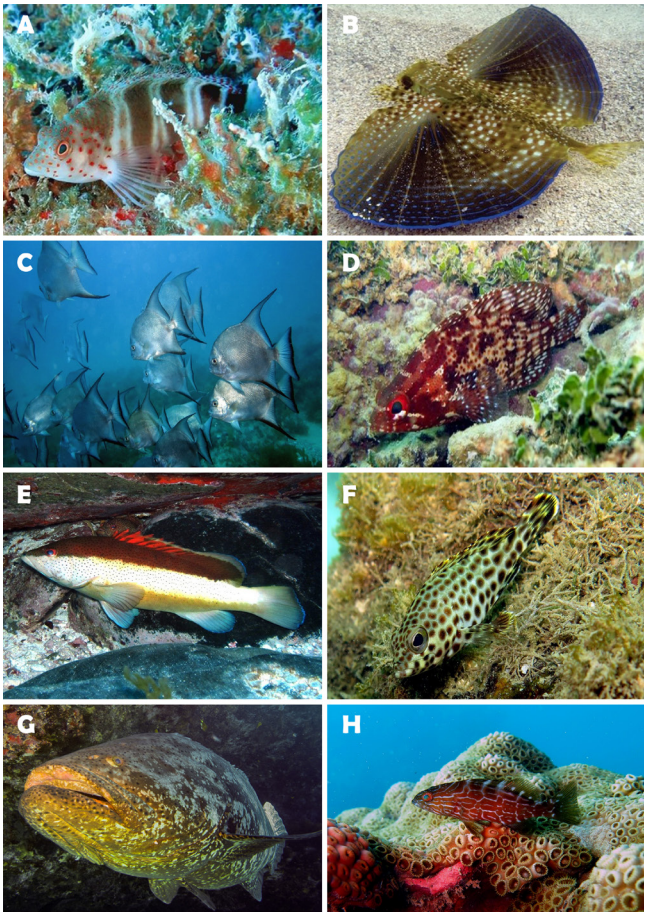


FIGURE 6 | Fish biodiversity from MPA Costa dos Corais. **A.** *Amblycirrhitus pinos* (~ 10 cm TL). **B.** *Dactylopterus volitans* (~ 20 cm TL). **C.** *Chaetodipterus faber* (~ 30 cm TL). **D.** *Alphestes afer* (~ 25 cm TL). **E.** *Cephalopholis fulva* (~ 30 cm TL). **F.** *Epinephelus adscensionis* (~ 20 cm TL). **G.** *Epinephelus itajara* (~ 110 cm TL). **H.** *Mycteroperca bonaci* (~ 15 cm TL).

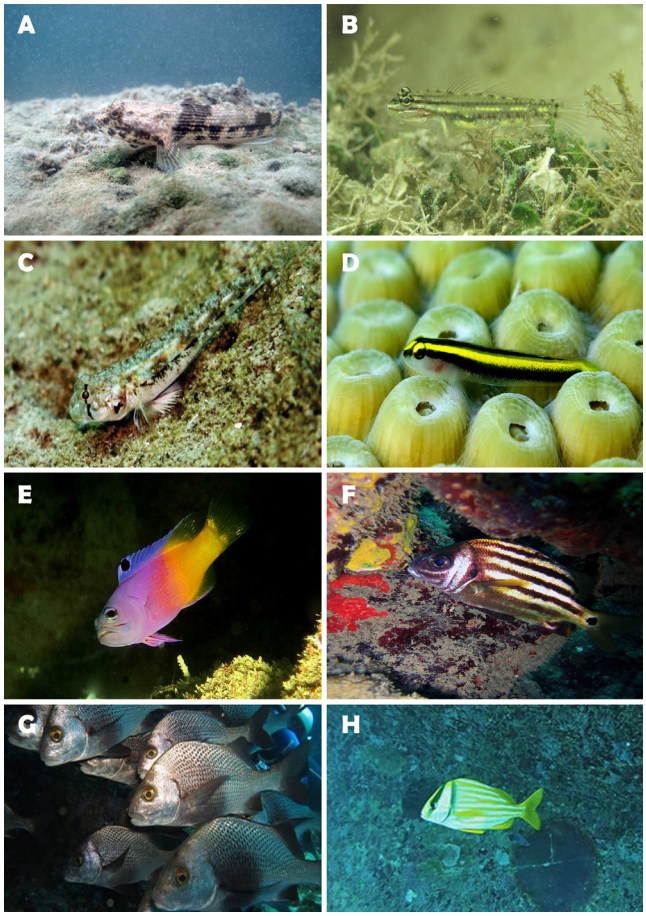


FIGURE 7 | Fish biodiversity from MPA Costa dos Corais. **A.** *Bathygobius soporator* (~ 8 cm TL). **B.** *Coryphopterus glaucofraenum* (~ 5 cm TL). **C.** *Ctenogobius saepepallens* (~ 4 cm TL). **D.** *Elacatinus figaro* (~ 4 cm TL). **E.** *Gramma brasiliensis* (~ 5 cm TL). **F.** *Paranisotremus moricandi* (~ 15 cm TL). **G.** *Anisotremus surinamensis* (~ 20 cm TL). **H.** *Anisotremus virginicus* (~ 20 cm TL).

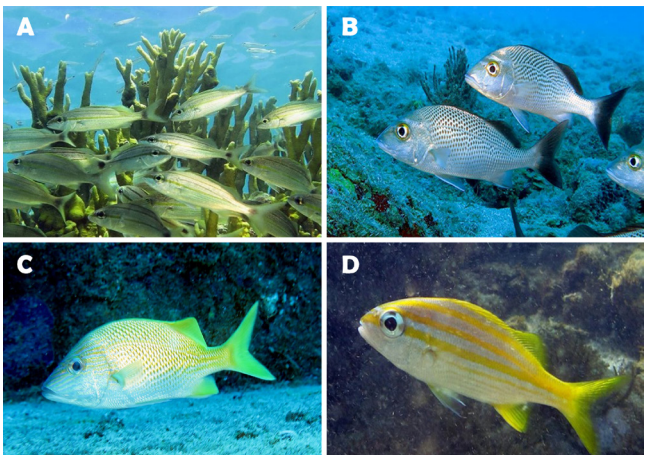


FIGURE8 | Fish biodiversity from MPA Costa dos Corais. **A.** *Haemulon aurolineatum* (~ 18 cm TL). **B.** *Haemulon parra* (~ 25 cm TL). **C.** *Haemulon plumieri* (~ 25 cm TL). **D.** *Haemulon squamipinna* (~ 18 cm TL). **E.** *Myripristis jacobus* (~ 20 cm TL). **F.** *Bodianus rufus* (~ 20 cm TL). **G.** *Clepticus brasiliensis* (~ 30 cm TL). **H.** *Halichoeres brasiliensis* (~ 20 cm TL).

Deeper reefs (> 30 m depth) have been considered less impacted from anthropogenic effects compared to shallow reefs (< 30 m depth) (Jankowski *et al*., 2015; Pereira *et al*., 2018); although it is not universal statement (Rocha *et al*., 2018). On the studied multiple use MPA, several species once frequently recorded on shallow areas such as barracudas (*Sphyraena barracuda*), snappers (*Lutjanus* spp.) and large parrotfishes (*Scarus* spp. and *Sparisoma* spp.) are currently recorded nearly unique at deeper reefs. For instance, Pereira *et al.* (2021) demonstrated by local ecological knowledge (LEK) that fishers used to catch the endemic and endangered parrotfish *Scarus trispinosus* on shallow reefs three decades ago. Yet, the species is currently rarely recorded at shallow sites; with the remaining populations inhabiting deeper reefs (Pereira *et al*., 2021). Additionally, fish behavior has been altered inside the MPA following human presence (tourism and/or fishing activity). Benevides *et al.* (2019) indicated that the zoning applied by APACC has a positive effect on the caution of target species, wherein in the tourist zone, where fishing is prohibited, fish allows a closer approach to the diver than in fishing area. Pereira *et al.* (2020) also suggested that fish species on shallow reefs tend to be less tolerant to human presence compared to individuals inhabiting deeper reefs. This could be supporting the idea that deeper reefs could be currently used by fish as "refuge" areas that are likely to be safeguarding both fish communities and species behavior.

Rezoning process on MPA Costa dos Corais has been recently conducted and published (ICMBio, 2021). During rezoning process, a series of new *no-take zones* have been selected and thoughtfully discussed with local communities to increase coral reefs conservation and effective local community engagement. However, it should be noted that there are controversies regarding the shared use of multiple use locations by fishers. These differences are mainly due to the dispute over territories between fishers and the tourism industry. Catamarans, speedboats, and jet skis are perceived by artisanal fishers as negative impacts that keep fish away and cause damage to fishing gear. In this context, the importance of the management plan aims to regulate nautical activity is appreciated, supporting biodiversity conservation, as well as strengthening artisanal fishing activity and community-based tourism.

This no-take zones effort represents an increase of 900% in *no-take zones* inside the MPA Costa dos Corais that, together with local engagement, will represent a major conservation outcome on large scale reef fish conservation for the SWA Ocean. Most of these new *no-take zones* encompass both shallow and deeper reefs allowing a cross-shelf protection of reef biodiversity and ensuring connectivity of fish population between multiple habitats such as shallow and deeper reefs, seagrass and algae beds, mud/sand bottoms and rhodolith beds.

A total of 12% (40 species) from the present study are registered on the 2020 IUCN red list as Near Threatened (NT), Vulnerable (VU), Endangered (EN) or Critically Endangered (CR). Additionally, 9% (29 species) are on Brazilian red list species (ICMBio, 2018). Overexploitation of many Brazilian reef fish species have been reported by several authors (Di Dario *et al*., 2015; Pereira *et al*., 2021). Studies suggested that a total of 60% of the red-listed marine species are primarily jeopardized by overfishing and the remaining 40% are threatened by habitat degradation and other non-fisheries related impacts (Pinheiro *et al*., 2015). However, fisheries monitoring along Brazilian coast is nearly inexistent and only 0.8% of the coastal zone is included within no-take areas (Di Dario *et al*., 2015; Vila-Nova *et al*., 2014); regardless, consistent evidence of *no-*

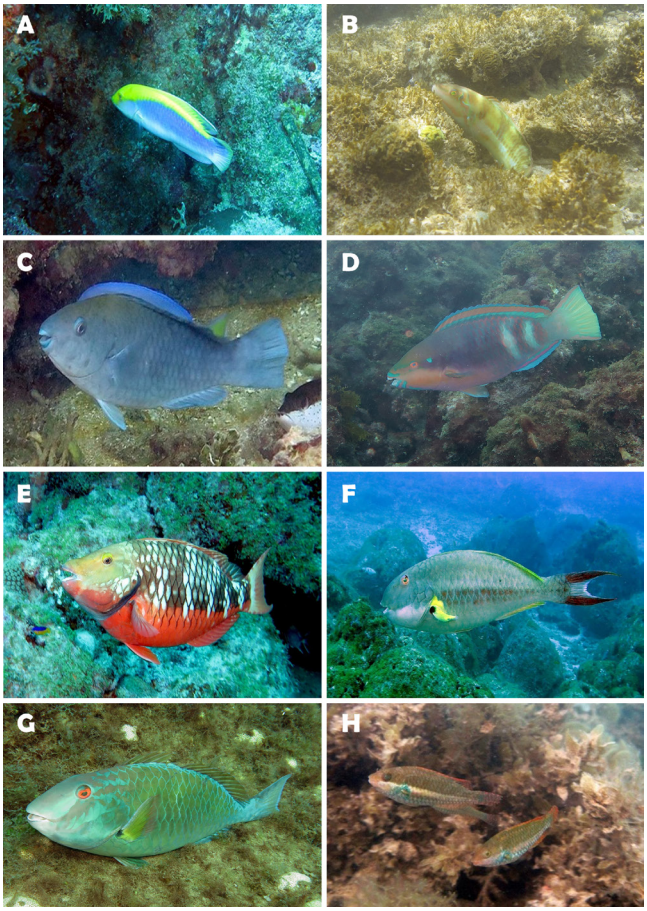


FIGURE 9 | Fish biodiversity from MPA Costa dos Corais. **A.** *Halichoeres dimidiatus* (~ 10 cm TL). **B.** *Halichoeres poeyi* (~ 12 cm TL). **C.** *Scarus trispinosus* (~ 25 cm TL). **D.** *Scarus zelindae* (~ 30 cm TL). **E.** *Sparisoma amplum* (~ 35 cm TL). **F.** *Sparisoma axillare* (~ 32 cm TL). **G.** *Sparisoma frondosum* (~ 30 cm TL). **H.** *Sparisoma radians* (~ 15 cm TL).

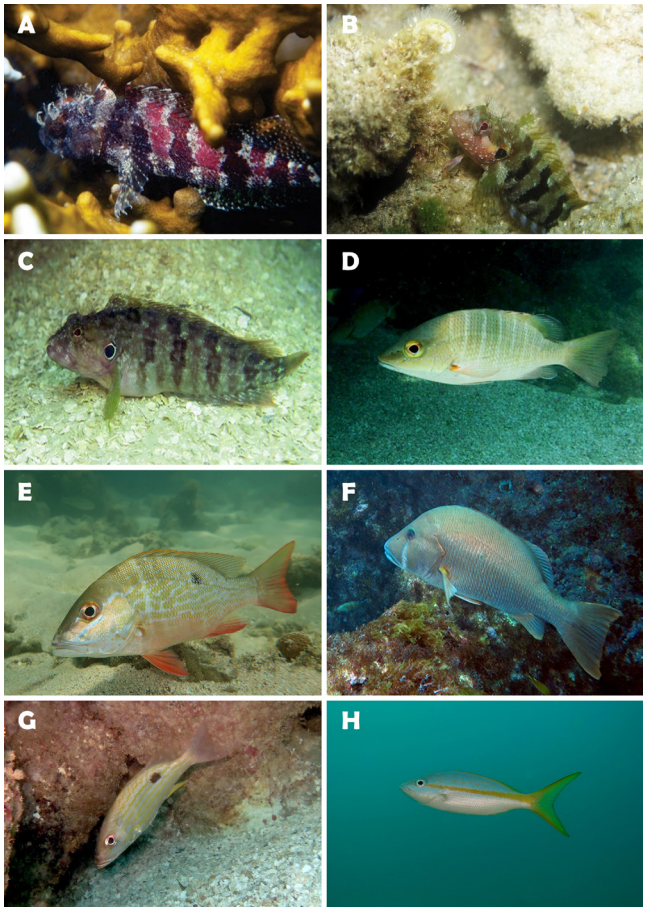
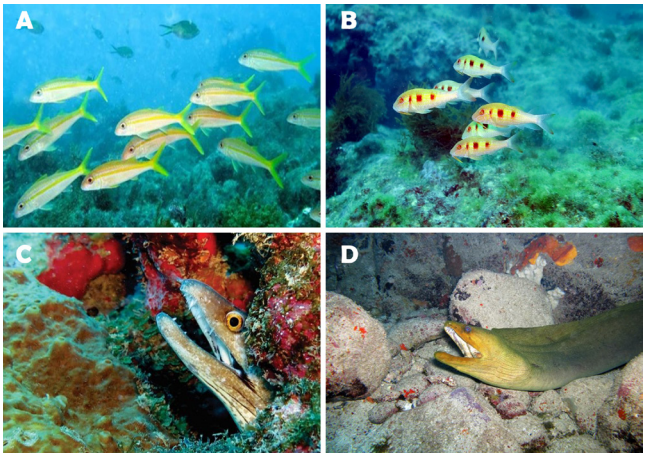


FIGURE 10 | Fish biodiversity from MPA Costa dos Corais. **A.** *Gobioclinus kalisherae* (~ 5 cm TL). **B.** *Labrisomus cricota* (~ 4 cm TL). **C.** *Labrisomus nuchipinnis* (~ 5 cm TL). **D.** *Lutjanus alexandrei* (~ 20 cm TL). **E.** *Lutjanus analis* (~ 22 cm TL). **F.** *Lutjanus jocu* (~ 30 cm TL). **G.** *Lutjanus synagris* (~ 20 cm TL). **H.** *Ocyurus chrysurus* (~ 18 cm TL).



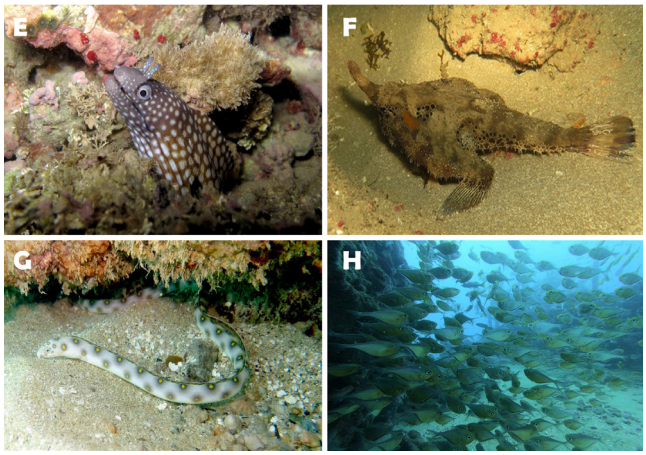


FIGURE 11 | Fish biodiversity from MPA Costa dos Corais. **A.** *Mulloidichthys martinicus* (~ 20 cm TL). **B.** *Pseudupeneus maculatus* (~ 18 cm TL). **C.** *Gymnothorax vicinus* (~ 30 cm TL). **D.** *Gymnothorax funebris* (~ 80 cm TL). **E.** *Muraena pavonina* (~ 50 cm TL). **F.** *Ogcocephalus vespertilio* (~ 20 cm TL). **G.** *Myrichthys ocellatus* (~ 30 cm TL). **H.** *Pempheris schomburgkii* (~ 5 cm TL).

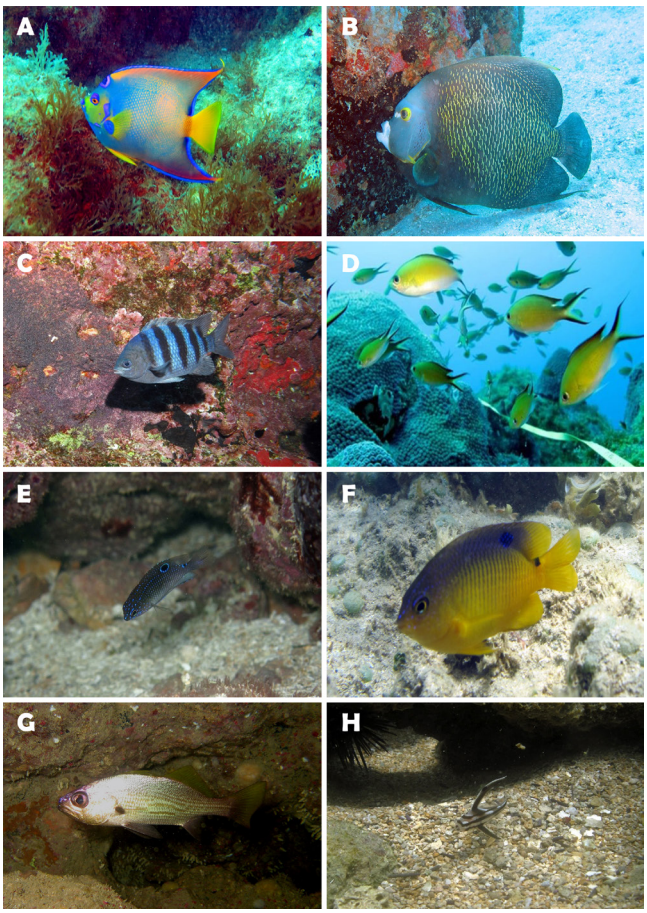


FIGURE 12 | Fish biodiversity from MPA Costa dos Corais. **A.** *Holacanthus ciliaris* (~ 30 cm TL). **B.** *Pomacanthus paru* (~ 25 cm TL). **C.** *Abudefduf saxatilis* (~ 10 cm TL). **D.** *Azurina multilineata* (~ 8 cm TL). **E.** *Stegastes fuscus* (~ 5 cm TL). **F.** *Stegastes variabilis* (~ 5 cm TL). **G.** *Odontoscion dentex* (~ 10 cm TL). **H.** *Pareques acuminatus* (~ 4 cm TL).

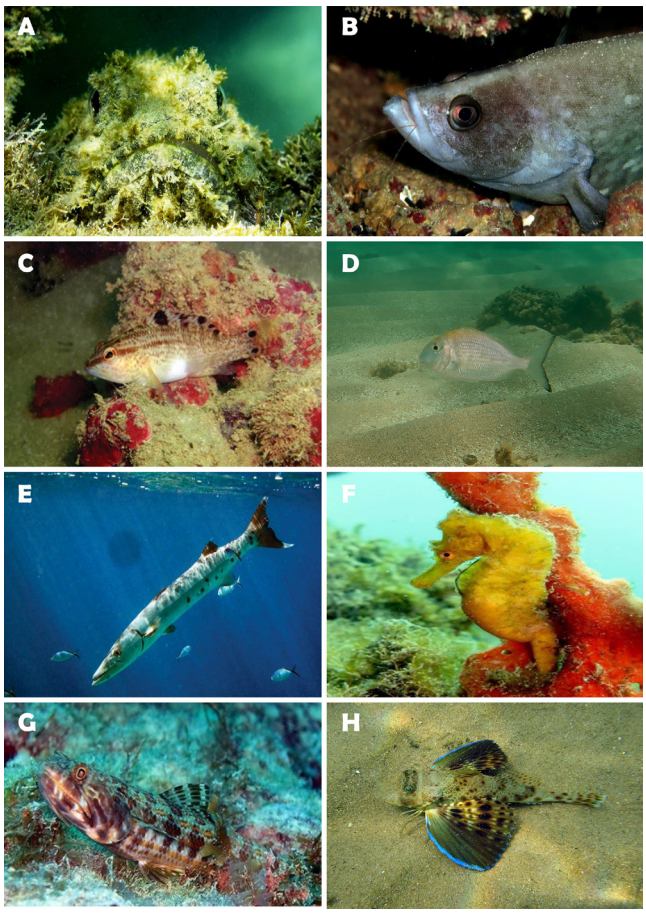


FIGURE 13 | Fish biodiversity from MPA Costa dos Corais. **A.** *Scorpaena plumieri* (~ 20 cm TL). **B.** *Rypticus saponaceus* (~ 22 cm TL). **C.** *Serranus flaviventris* (~ 8 cm TL). **D.** *Calamus penna* (~ 12 cm TL). **E.** *Sphyraena barracuda* (~ 60 cm TL). **F.** *Hippocampus reidi* (~ 8 cm TL). **G.** *Synodus intermedius* (~ 25 cm TL). **H.** *Prionotus punctatus* (~ 18 cm TL).

take MPAs and strict no-entry marine reserves demonstrating a fish recovery/spillover potential (Francini, Moura, 2008; Anderson *et al*., 2014; Motta *et al*., 2021; PHCP and collaborators, work in progress).

Coral cover and structural complexity have been described as an important variable influencing reef fish abundance and richness worldwide (Pereira, Munday, 2016; Darling *et al*., 2017). An increase on habitat complexity, food provision and shelter suggest that higher coral cover is likely to increase fish diversity (Leal *et al*., 2015; Mora, 2015). Previous studies have demonstrated up to 50% of coral cover on some areas of the MPA (PHCP and collaborators, work in progress), a much higher coral cover value compared to Brazilian coast with an average of 4.38% ± 8.17 (Aued *et al*., 2018). Hence, together with Abrolhos bank (up to 21% of coral cover) (Teixeira *et al*., 2021), MPA Costa dos Corais stands as one of highest coral cover areas on Brazilian coast. This trend likely to influence and explain such a high reef fish richness, featuring an unique and relevant site for fish biodiversity and conservation on the Southwestern Atlantic Ocean.

Brazilian marine biodiversity has been recently jeopardized due to a series of inconsistent governmental policies (Pinheiro *et al*., 2015; Miranda *et al*., 2020). Many SWA biodiversity hotspots are under risk such Fernando de Noronha Archipelago – UNESCO Heritage, Vitória-Trindade Chain (VTC), Abrolhos Bank and MPA Costa dos Corais (Mazzei *et al*., 2017; Magris *et al*., 2020; Pimentel *et al*., 2020) that would compromise reef fish biodiversity on SWA. Hence, local strategies such as co-management, surveillance and local community compliance/engagement seems to be vital approaches for marine habitat conservation and maintenance of reef fish populations.

ACKNOWLEDGMENTS

We would like to thank Julian Caon for map preparation. We also thank APACC management team and Projeto Conservação Recifal (PCR) staff for all the help during field activity. This work is part of the Long-Term Ecological Research – Brazil site PELD-CCAL (Projeto Ecológico de Longa Duração - Costa dos Corais Alagoas) funded by the Brazilian National Council for Scientific and Technological Development – CNPq (#441657/2016-8), the Brazilian Coordination for the Improvement of Higher Education Personnel PELD/CAPES (23038.000452/2017-16) and the Research Support Foundation of the State of Alagoas – FAPEAL (#60030.1564/2016). This study was also supported by: Rufford Small Grants, Instituto Linha D'Água (Edital Linha D'Água Tubarões e Raias), "Reef fish under diver influence: behavioual changes and subsidies for management of underwater tourism" (FAPEAL 600030001270/2017), Conservation Leadership Program (CLP), Marine Conservation Action Fund, Mohamed Bin Zayed Species Conservation and The Prince Bernhard Nature Fund (PBNF) grants for PHCP and PCR. We thank Fundação SOS Mata Atlântica and Fundação Toyota for support during APACC field trips.

REFERENCES

- **Adey WH.** Coral reef ecosystems and human health: biodiversity counts! Ecosyst Health. 2000; 6(4):227–36. https://doi.org/10.1046/j.1526-0992.2000.006004227.x
- **Anderson AB, Bonaldo RM, Barneche DR, Hackradt CW, Félix-Hackradt FC, García-Charton JA, Floeter SR.** Recovery of grouper assemblages indicates effectiveness of a marine protected area in Southern Brazil. Mar Ecol Prog Ser. 2014; 514:207–15. https://doi.org/10.3354/meps11032
- **Andrades R, Reis-Filho JA, Macieira RM, Giarrizzo T, Joyeux J-C.** Endemic fish species structuring oceanic intertidal reef assemblages. Sci Rep. 2018; 8(10791):1–09. https://doi.org/10.1038/s41598-018-29088-0
- **Araújo ME, Mattos FMG, Melo FPL, Chaves LCT, Feitosa CV, Lippi DL *et al*.** Diversity patterns of reef fish along the Brazilian tropical coast. Mar Environ Res. 2020; 160:e105038. https://doi.org/10.1016/j.marenvres.2020.105038
- **Aued AW, Smith F, Quimbayo JP, Cândido DV, Longo GO, Ferreira CEL, Witman JD, Floeter SR, Segal B.** Large-scale patterns of benthic marine communities in the Brazilian Province. PLoS ONE. 2018; 13(6):e0198452. https://doi.org/10.1371/journal.pone.0198452

- **Benevides LJ, Cardozo-Ferreira GC, Ferreira CEL, Pereira PHC, Pinto TK, Sampaio CLS.** Fear-induced behavioural modifications in damselfishes can be diver-triggered. J Exp Mar Biol Ecol. 2019; 514–515:34–40. https://doi.org/10.1016/j.jembe.2019.03.009
- **Brander LM, Van Beukering P, Cesar HSJ.** The recreational value of coral reefs: A meta-analysis. Ecol Econ. 2007; 63(1):209–18. https://doi.org/10.1016/j.ecolecon.2006.11.002
- **Carvalho-Filho A, Sazima I, Lima SMQ, Almeida D, Mendes L, Dias RM *et al*.** Review of the genus *Malacoctenus* (Actinopterygii: Labrisomidae) from the Southwestern Atlantic, with description of two new species. Zootaxa. 2020; 4819(3):499–520. https://doi.org/10.11646/zootaxa.4819.3.4
- **Cordeiro CAMM, Quimbayo JP, Nunes JACC, Nunes LT, Sissini MN, Sampaio CLS *et al*.** Conservation status of the southernmost reef of the Amazon Reef System: The Parcel de Manuel Luis. Coral Reefs. 2021; 40(1):165–85. https://doi.org/10.1007/s00338-020-02026-1
- **Cowburn B, Moritz C, Birrell C, Grimsditch G, Abdulla A.** Can luxury and environmental sustainability co-exist? Assessing the environmental impact of resort tourism on coral reefs in the Maldives. Ocean Coast Manage. 2018; 158:120–27. https://doi.org/10.1016/j.ocecoaman.2018.03.025
- **Darling ES, Graham NAJ, Januchowski-Hartley FA, Nash KL, Pratchett MS, Wilson SK.** Relationships between structural complexity, coral traits, and reef fish assemblages. Coral Reefs. 2017; 36:561–75. https://doi.org/10.1007/s00338-017-1539-z
- **Davenport J, Davenport JL.** The impact of tourism and personal leisure transport on coastal environments: A review. Estuar Coast Shelf Sci. 2006; 67(1–2):280–92. https://doi.org/10.1016/j.ecss.2005.11.026
- **Di Dario F, Alves CBM, Boos H, Frédou FL, Lessa RPT, Mincarone MM *et al*.** A better way forward for Brazil's fisheries. Science. 2015; 347:1079. https://doi.org/10.1126/science.347.6226.1079-a
- **Emslie MJ, Logan M, Williamson DH, Ayling AM, MacNeil MA, Ceccarelli D *et al*.** Expectations and outcomes of reserve network performance following re-zoning of the Great Barrier Reef Marine Park. Curr Biol. 2015; 25(8):983–92. https://doi.org/10.1016/j.cub.2015.01.073
- **Ferreira BP, Costa MBSF, Coxey MS, Gaspar ALB, Veleda D, Araujo M.** The effects of sea surface temperature anomalies on oceanic coral reef systems in the southwestern tropical Atlantic. Coral Reefs. 2013; 32:441–54. https://doi.org/10.1007/s00338-012-0992-y
- **Ferreira CEL, Floeter SR, Gasparini JL, Ferreira BP, Joyeux JC.** Trophic structure patterns of Brazilian reef fishes: a latitudinal comparison. J Biogeogr. 2004; 31(7):1093–106. https://doi.org/10.1111/j.1365-2699.2004.01044.x
- **Floeter SR, Halpern BS, Ferreira CEL.** Effects of fishing and protection on Brazilian reef fishes. Biol Conserv. 2006; 128:391–402. https://doi.org/10.1016/j.biocon.2005.10.005
- **Floeter SR, Rocha LA, Robertson DR, Joyeux JC, Smith-Vaniz WF, Wirtz P *et al*.** Atlantic reef fish biogeography and evolution. J Biogeogr. 2008; 35(1):22–47. https://doi.org/10.1111/j.1365-2699.2007.01790.x
- **Francini-Filho RB, de Moura RL.** Dynamics of fish assemblages on coral reefs subjected to different management regimes in the Abrolhos Bank, eastern Brazil. Aquat Conserv. 2008; 18(7):1166–79. https://doi.org/10.1002/aqc.966
- **Freitas JEP, Lotufo TMC.** Reef fish assemblage and zoogeographic affinities of a scarcely known region of the western equatorial Atlantic. J Mar Biol Assoc UK. 2014; 95(3):623–33. https://doi.org/10.1017/S0025315414001404
- **Gibran FZ, Moura RL.** The structure of rocky reef fish assemblages across a nearshore to coastal islands' gradient in Southeastern Brazil. Neotrop Ichthyol. 2012; 10(2):369–82. https://doi.org/10.1590/S1679-62252012005000013
- **Gomes UL, Rosa RS, Gadig OBF.** *Dasyatis marianae* sp. n.: A new species of stingray (Chondrichthyes: Dasyatidae) from the Southwestern Atlantic. Copeia. 2000; 2000(2):510–15. https://doi.org/10.1643/0045-8511(2000)000[0510:DMSNAN]2.0.CO;2

- **Graham NAJ, McClanahan TR, MacNeil MA, Wilson SK, Cinner JE, Huchery C *et al*.** Human disruption of coral reef trophic structure. Curr Biol. 2017; 27:231–36. https://doi.org/10.1016/j.cub.2016.10.062
- **Guabiroba HC, Pimentel CR, Mariano Macieira R, Cardozo-Ferreira GC, Teixeira JB, Gasparini JL *et al*.** New records of fishes for the Vitória-Trindade Chain, southwestern Atlantic. Check List. 2020; 16(3):699–705. https://doi.org/10.15560/16.3.699
- **Hall AE, Cameron DS, Kingsford MJ.** Partially protected areas as a management tool on inshore reefs. Rev Fish Biol Fish. 2021; 31:631–51. https://doi.org/10.1007/s11160-021-09654-y
- **ICMBio.** Livro vermelho da fauna brasileira ameaçada de extinção. Brasília: ICMBio/MMA. 2018.
- **ICMBio.** Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio). Management Plan of MPA Costa dos Corais. Portaria N° 308 [Internet]. Brasília; 2021. Available from: https://www.icmbio.gov.br/apacostadoscorais/plano-de-manejo
- **Jankowski MW, Graham NAJ, Jones GP.** Depth gradients in diversity, distribution and habitat specialisation in coral reef fishes: implications for the depth-refuge hypothesis. Mar Ecol Prog Ser. 2015; 540:203–15. https://doi.org/10.3354/meps11523
- **Leal ICS, de Araujo ME, da Cunha SR, Pereira PHC.** The influence of fire-coral colony size and agonistic behaviour of territorial damselfish on associated coral reef fish communities. Mar Environ Res. 2015; 108:45–54. https://doi.org/10.1016/j.marenvres.2015.04.009
- **Leão ZMAN, Kikuchi RKP, Ferreira BP, Neves EG, Sovierzoski HH, Oliveira MDM *et al*.** Brazilian coral reefs in a period of global change: A synthesis. Braz J Oceanogr. 2016; 64:97–116. https://doi.org/10.1590/S1679-875920160916064sp2
- **Leão ZMAN, Kikuchi RKP, Testa V.** Corals and coral reefs of Brazil. In: Cortés J, editor. Latin American Coral Reefs. Amsterdam: Elsevier Science; 2003. p.9–52. https://doi.org/10.1016/B978-044451388-5/50003-5
- **Lellys NT, Moura RL, Bonaldo RM, Francini-Filho RB, Gibran FZ.** Parrotfish functional morphology and bioerosion on SW Atlantic reefs. Mar Ecol Prog Ser. 2019; 629:149–63. https://doi.org/10.3354/meps13102
- **Maida M, Ferreira BP.** Coral Reefs of Brazil: Overview and field guide. In: Proc. 8th Int Coral Reef Sym. 1997; 1(263):74.
- **Magris RA, Costa MDP, Ferreira CEL, Vilar CC, Joyeux JC, Creed JC *et al*.** A blueprint for securing Brazil's marine biodiversity and supporting the achievement of global conservation goals. Divers Distrib. 2020; 27(2):198–215. https://doi.org/10.1111/ddi.13183
- **Matheus Z, Francini-Filho RB, Pereira-Filho GH, Moraes FC, Moura RL, Brasileiro PS *et al*.** Benthic reef assemblages of the Fernando de Noronha Archipelago, tropical South-west Atlantic: Effects of depth, wave exposure and cross-shelf positioning. PLoS ONE. 2019; 14(1):e0210664. https://doi.org/10.1371/journal.pone.0210664
- **Mazzei EF, Bertoncini AA, Pinheiro HT, Machado LF, Vilar CC, Guabiroba HC *et al*.** Newly discovered reefs in the southern Abrolhos Bank, Brazil: Anthropogenic impacts and urgent conservation needs. Mar Pollut Bulletin. 2017; 114(1):123–33. https://doi.org/10.1016/j.marpolbul.2016.08.059
- **Miranda RJ, Malhado ACM, Fabré N, Batista V, Santos R, Campos-Silva J *et al*.** Integrating long term ecological research (lter) and marine protected area management: challenges and solutions. Oecologia Australis. 2020; 24(2):279–300. https://doi.org/10.4257/oeco.2020.2402.05
- **Moberg F, Folke C.** Ecological goods and services of coral reef ecosystems. Ecol Econ. 1999; 29(2):215–33. https://doi.org/10.1016/S0921-8009(99)00009-9
- **Mora C, Andréfouët S, Costello MJ, Kranenburg C, Rollo A, Veron J *et al*.** Coral reefs and the global network of marine protected areas. Science. 2006; 312(5781):1750–51. https://doi.org/10.1126/science.1125295
- **Mora C.** Ecology of fishes on Coral Reefs. Cambridge: Cambridge University Press; 2015.

- **Motta FS, Moura RL, Neves LM, Souza GR, Gibran FZ, Francini CL *et al*.** Effects of marine protected areas under different management regimes in a hot spot of biodiversity and cumulative impacts from SW Atlantic. Reg Stud Mar Sci. 2021; 47:101951. https://doi.org/10.1016/j.rsma.2021.101951
- **Morais RA, Ferreira CEL, Floeter SR.** Spatial patterns of fish standing biomass across Brazilian reefs. J Fish Biol. 2017; 91(6):1642–67. https://doi.org/10.1111/jfb.13482
- **Moura RL, Abieri ML, Castro GM, Carlos-Júnior LA, Chiroque-Solano PM, Fernandes NC *et al*.** Tropical rhodolith beds are a major and belittled reef fish habitat. Scientific reports. 2021; 11(1):1–10. https://doi.org/10.1038/s41598-020-80574-w
- **Pandolfi JM, Connolly SR, Marshall DJ, Cohen AL.** Projecting coral reef futures under global warming and ocean acidification. Science. 2011; 333(6041):418–22. https://doi.org/10.1126/science.1204794
- **Paula YC, Schiavetti A, Sampaio CLS, Calderon E.** The effects of fish feeding by visitors on reef fish in a Marine Protected Area open to tourism. Biota Neotrop. 2018; 18(3):e20170339. https://doi.org/10.1590/1676-0611-bn-2017-0339
- **Pereira PHC, Munday PL.** Coral colony size and structure as determinants of habitat use and fitness of coral-dwelling fishes. Mar Ecol Prog Ser. 2016; 553:163–72. https://doi.org/10.3354/meps11745
- **Pereira PHC, Macedo CH, Nunes JACC, Marangoni LFB, Bianchini A.** Effects of depth on reef fish communities: Insights of a "deep refuge hypothesis" from Southwestern Atlantic reefs. PLoS One. 2018; 13(9):e0203072. https://doi.org/10.1371/journal.pone.0203072
- **Pereira PHC, Macedo CHR, de Lima GV, Benevides LJ.** Effects of depth on reef fish flight initiation distance: implications of deeper reefs conservation. Environ Biol Fishes. 2020; 103(10):1247–56. https://doi.org/10.1007/s10641-020-01017-z
- **Pereira PHC, Moraes RL, Santos MVB, Lippi DL, Feitosa JLL, Pedrosa M.** The influence of multiple factors upon reef fish abundance and species richness in a tropical coral complex. Ichthyol Res. 2014; 61:375–84. https://doi.org/10.1007/s10228-014-0409-8
- **Pereira PHC, Ternes MLF, Nunes JACC, Giglio VJ.** Overexploitation and behavioral changes of the largest South Atlantic parrotfish (*Scarus trispinosus*): evidence from Fishers' knowledge. Biol Conserv. 2021; 254:108940. https://doi.org/10.1016/j.biocon.2020.108940
- **Petean FF, Naylor GJP, Lima SMQ.** Integrative taxonomy identifies a new stingray species of the genus *Hypanus* Rafinesque, 1818 (Dasyatidae, Myliobatiformes), from the Tropical Southwestern Atlantic. J Fish Biol. 2020; 97(4):1120–42. https://doi.org/10.1111/jfb.14483
- **Pimentel CR, Rocha LA, Shepherd B, Phelps TAY, Joyeux JC, Martins AS *et al*.** Mesophotic ecosystems at Fernando de Noronha Archipelago, Brazil (South-western Atlantic), reveal unique ichthyofauna and need for conservation. Neotrop Ichthyol. 2020;18(4):e200050. https://doi.org/10.1590/1982-0224-2020-0050
- **Pinheiro HT, Joyeux J-C, Moura RL.** Reef oases in a seamount chain in the southwestern Atlantic. Coral Reefs. 2014; 33:1113–13. https://doi.org/10.1007/s00338-014-1211-9
- **Pinheiro HT, Mazzei E, Moura RL, Amado-Filho GM, Carvalho-Filho A, Braga AC *et al*.** Fish biodiversity of the Vitória-Trindade Seamount Chain, Southwestern Atlantic: An updated database. PLoS ONE. 2015; 10(3):e0118180. https://doi.org/10.1371/journal.pone.0118180
- **Pinheiro HT, Rocha LA, Macieira RM, Carvalho-Filho A, Anderson AB, Bender MG *et al*.** South-western Atlantic reef fishes: Zoogeographical patterns and ecological drivers reveal a secondary biodiversity centre in the Atlantic Ocean. Divers Distrib. 2018; 24(7):951–65. https://doi.org/10.1111/ddi.12729
- **Reaka-Kudla ML.** The global biodiversity of coral reefs: a comparison with rain forests. In: Reaka-Kudla ML, Wilson DE, Wilson ED, editors. Biodiversity II: Understanding and protecting our biological resources. Washington, D.C.: Joseph Henry Press; 1997. p.2: 551.

- **Rocha LA, Pinheiro HT, Shepherd B, Papastamatiou YP, Luiz OJ, Pyle RL *et al*.** Mesophotic coral ecosystems are threatened and ecologically distinct from shallow water reefs. Science. 2018; 361(6399):281–84. https://doi.org/10.1126/science.aaq1614
- **Rolim FA, Langlois T, Rodrigues PFC, Bond T, Motta FS, Neves LM *et al*.** Network of small no-take marine reserves reveals greater abundance and body size of fisheries target species. PLoS ONE. 2019; 14(1):e0204970. https://doi.org/10.1371/journal.pone.0204970
- **Ruppert JLW, Vigliola L, Kulbicki M, Labrosse P, Fortin M-J, Meekan MG.** Human activities as a driver of spatial variation in the trophic structure of fish communities on Pacific coral reefs. Glob Chang Biol. 2018; 24(1):e67–e79. https://doi.org/10.1111/gcb.13882
- **Sampaio CLS, Santander-neto J, Costa TLA.** Hogfish *Lachnolaimus maximus* (Labridae) confirmed in the south-western Atlantic Ocean. J Fish Biol. 2016; 89(3):1873–79. https://doi.org/10.1111/jfb.13075
- **Smith-Vaniz WF, Tornabene L, Macieira RM.** Review of Brazilian jawfishes of the genus *Opistognathus* with descriptions of two new species (Teleostei, Opistognathidae). ZooKeys. 2018; 794:95–133. https://doi.org/10.3897/zookeys.794.26789
- **Soares MO, Rossi S, Gurgel AR, Lucas CC, Tavares TC, Diniz B *et al*.** Impacts of a changing environment on marginal coral reefs in the Tropical Southwestern Atlantic. Ocean Coast Manag. 2021; 210:105692. https://doi.org/10.1016/j.ocecoaman.2021.105692
- **Spalding M, Burke L, Wood SA, Ashpole J, Hutchison J, zu Ermgassen P.** Mapping the global value and distribution of coral reef tourism. Mar Policy. 2017; 82:104–13. https://doi.org/10.1016/j.marpol.2017.05.014
- **Teixeira CD, Chiroque-Solano PM, Ribeiro FV, Carlos-Júnior LA, Neves LM, Salomon OS *et al*.** Decadal (2006–2018) dynamics of Southwestern Atlantic's largest turbid zone reefs. PloS One. 2021; 16(2):e0247111. https://doi.org/10.1371/journal.pone.0247111
- **Villa-Nova DA, Ferreira CEL, Barbosa FG, Floeter SR.** Reef fish hotspots as surrogates for marine conservation in the Brazilian coast. Ocean Coast Manag. 2014; 102:88–93. https://doi.org/10.1016/j.ocecoaman.2014.09.005

AUTHORS' CONTRIBUTION

Pedro H. C. Pereira: Conceptualization, Funding acquisition, Data curation, Writing-original draft, Writing-review and editing.

Luís França Côrtes: Data curation, Conceptualization, Writing-review and editing.

Gislaine Vanessa de Lima: Conceptualization, Writing-review and editing.

Erandy Gomes da Silva: Conceptualization, Writing-review and editing.

Antônio Vitor Farias Pontes: Conceptualization, Writing-review and editing.

Felipe Mattos: Data curation, Conceptualization, Writing-review and editing.

Maria Elisabeth de Araújo: Data curation, Conceptualization, Writing-review and editing.

Flávio Ferreira-Junior: Conceptualization, Writing-review and editing.

Cláudio Luis Santos Sampaio: Formal analysis, Funding acquisition, Investigation, Methodology, Writing-original draft, Writing-review and editing.

ETHICAL STATEMENTS

This study was conducted under full approval of the Sistema Nacional de Informação sobre Biodiversidade (SISBIO), permit # 67684–1.

Neotropical Ichthyology

OPEN ACCESS

Official Journal of the
Sociedade Brasileira de Ictiologia

COMPETING INTERESTS

The authors declare no competing interests.

HOW TO CITE THIS ARTICLE

- **Pereira PHC, Côrtes LGF, Lima GV, Gomes E, Pontes AVF, Mattos F, Araújo ME, Ferreira-Junior F, Sampaio CLS.** Reef fishes biodiversity and conservation at the largest Brazilian coastal Marine Protected Area (MPA Costa dos Corais). Neotrop Ichthyol. 2021; 19(4):e210071. https://doi.org/10.1590/1982-0224-2021-0071