Ictiofauna estuarina do nordeste do Brasil: variabilidade espacial e indicadores funcionais

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PRÓ-REITORIA DE PESQUISA E PÓS-GRADUAÇÃO

PROGRAMA DE PÓS-GRADUAÇÃO EM RECURSOS PESQUEIROS E AQUICULTURA (PPG-RPAq)

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Rayssa Rayanna Salvador de Siqueira Lima

Dissertação apresentada ao Programa de Pós-Graduação em Recursos Pesqueiros e Aquicultura da Universidade Federal Rural de Pernambuco, como exigência para obtenção do título de Mestre.

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Dedicatória

Aos meus pais e irmão, Edineide Salvador de Siqueira, Joel Pereira de Lima e Romário Siqueira. Aos meus avôs, Edi Borba de Siqueira, Quitéria Salvador de Siqueira (in memoriam) e Silvana Santos.

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“Every day is a new day. I´m thankful for every breath I take.. So, I learn from my mistakes. It´s beyond my control sometimes.. It´s best to let go, whatever happens in this lifetime.. (P.O.D.)”

Resumo

As zonas costeiras são áreas que possuem importantes funções ecológicas e servem de ligação entre os ecossistemas marinhos e terrestres. Esta peculiaridade se deve a inúmeras características, tais como variabilidade da salinidade, suporte à reprodução das espécies, e diversidade de fontes para alimentação e elevada disponibilidade de nutrientes, tornando-as ambientes complexos e de extrema importância para o ciclo de vida de espécies marinhas. Dentre os ecossistemas costeiros tropicais, os estuários e seus manguezais são áreas dinâmicas que desempenham distintos papeis, seja para pesca, turismo, local de proteção contra enchentes e tempestades, além de servir como fonte de renda e de alimento para diversas famílias de pescadores. A diversidade das espécies pode variar em uma escala local ou entre regiões, em uma escala geográfica. Aspectos físicos e biológicos podem influenciar nesses padrões de diversidade de espécies assim como a interação entre os seus componentes, causando diferenças dentro e entre as comunidades. Várias ferramentas podem ser utilizadas para se compreender os padrões de distribuição das espécies e seu funcionamento. Apesar da existência de estudos voltados sobre a biodiversidade da ictiofauna estuarina do Brasil, estes são geralmente pontuais e em reduzido número na região nordeste, não refletindo a quantidade de ambientes estuarinos ao longo do litoral da região, indicando uma deficiência no conhecimento da composição ictiofaunística dos mesmos. Este trabalho tem o objetivo geral de compreender os padrões geográficos da ictiofauna estuarina do Nordeste do Brasil, através do conhecimento dos aspectos estruturais das assembleias e índices funcionais. O primeiro capítulo fornece uma síntese das informações sobre a ictiofauna estuarina de seis dos mais importantes estuários de Pernambuco baseado em coletas entre os anos de 2000 e 2018 correlacionando com dados abióticos, totalizando 198 espécies de peixes. Dentre estas espécies, 80% foram caracterizados como marinhas migrantes e visitantes e 70% como zoobentívoros e piscívoros. O segundo capítulo fornece uma síntese das informações disponíveis sobre a ictiofauna estuarina do Nordeste do Brasil, identificando e caracterizando padrões geográficos, também analisando as similaridades taxonômica entre os 45 estuários estudados, totalizando 339 espécies de peixes. Espécies marinhas migrantes e visitantes foram 77% do número total de espécies e 72% foram consideradas zoobentívoras e piscívoras. Em ambos os artigos, cada espécie foi designada dentro das categorias da lista de espécies ameaçadas de extinção a nível regional (ICMbio) e/ou internacional (IUCN).

Palavras-Chave:

Estuários, lista vermelha, guildas, diversidade

Abstract

Coastal zones are areas that have important ecological functions and serve as a link between marine and terrestrial ecosystems. This peculiarity is due to numerous characteristics, such as salinity variability, support for the reproduction of species, different sources of food, and high availability of nutrients, making them complex environments and of extreme importance for the life cycle of marine species. Among the tropical coastal ecosystems, estuaries and their mangroves are dynamic areas that play important roles, whether on the socioeconomic, as a source of income and food for the communities that live nearby, or on the environmental aspect (e.g. nursing areas, protection against floods and storms). The diversity of species can vary on a local scale or between regions in a geographical scale. Physical and biological aspects can influence these patterns as well as the interaction among its components, causing differences within and among communities. Several tools can be used to understand the patterns of species distribution and function. Despite the existence of studies on the biodiversity of estuarine fish fauna in Brazil, these are generally in a low number and isolated in the northeastern region, not reflecting the number of estuarine environments along the coast of the region. It indicates a deficiency in the knowledge of their ichthyofaunal composition. This study has the general objective of understanding the geographic patterns of the estuarine ichthyofauna of Northeastern Brazil, through the knowledge of the structural aspects of the assemblages and functional indices. The first chapter provides a synthesis of information on the estuarine ichthyofauna of six of the most important estuaries of Pernambuco based on samples between the years 2000 and 2018 totaling 198 fish species and correlating with abiotic data to better understand their geographical patterns. Among these species, 80% were designated as marine migrants and stragglers and 70% as zoobenthivores and piscivores. The second chapter provides a synthesis of the available information on the estuarine ichthyofauna of Northeast Brazil, identifying and characterizing geographical patterns, also analyzing taxonomic similarities among the 45 studied estuaries totaling 339 fish species. Marine migrants and stragglers species were 77% of the total number of species and 72% were considered zoobenthivorous and piscivorous. In both articles, each species was designated a category of the regional (ICMbio) and/or international (IUCN) endangered species list.

Key words:

Estuaries, red list, guilds, diversity

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Sumário

1. Introdução

As zonas costeiras são áreas que possuem importantes funções ecológicas e servem de ligação entre os ecossistemas marinhos e terrestres. Esta peculiaridade se deve a inúmeras características, tais como variabilidade da salinidade, suporte à reprodução das espécies, e diversidade de fontes para alimentação e elevada disponibilidade de nutrientes, tornando-as ambientes complexos e de extrema importância para o ciclo de vida de espécies marinhas (MMA 2002; Gerling et al. 2016). Dentre os ecossistemas costeiros tropicais, os estuários e seus manguezais são áreas dinâmicas que desempenham distintos papeis, seja para pesca, turismo, local de proteção contra enchentes e tempestades, além de servir como fonte de renda e de alimento para diversas famílias de pescadores (Oliveira 1979; Boerema & Meire 2017). Os mesmos representam um dos ecossistemas mais produtivos, mesmo quando comparados com as florestas tropicais (Longhurst et al. 1995).

A região Nordeste compreende nove estados costeiros com uma extensão de 1.558.196 km2, abrangendo uma grande diversidade de características oceanográficas e geomorfológicas, bem como diferentes comunidades de peixes (Mateus et al. 2008; Costanza et al. 2014; Vasconcelos et al. 2015; Loureiro et al. 2016a).

A diversidade das espécies pode variar em uma escala local ou entre regiões. Aspectos físicos e biológicos podem influenciar nos padrões de diversidade de espécies assim como a interação entre os seus componentes, causando diferenças dentro e entre as comunidades. Várias ferramentas podem ser utilizadas para se compreender os padrões de distribuição das espécies e seu funcionamento. Diversidade taxonômica e riqueza funcional são parâmetros úteis para a avaliação da integridade e resiliência dos ecossistemas estuarinos. Tratos funcionais, expressos através de guildas e índices ecológicos, têm sido utilizados na avaliação do papel destes ecossistemas, além de avaliar os possíveis efeitos dos impactos antrópicos e das mudanças climáticas (Menge & Olson 1990; Blaber 2000; Flores-Lopes et al. 2010; Contente 2013). Guildas ecológicas são utilizadas para fornecer informações funcionais, estruturas hierárquicas e conectividade, visando simplificar o entendimento de ecossistemas complexos (Elliott et al. 2007b). Guilda trófica é definida como a forma que um grupo de espécies que, independentemente de sua afiliação taxonômica, exploram uma classe de recursos alimentares de maneira parecida (Elliott et al. 2007b). Guilda reprodutiva caracteriza-se como parte da estratégia reprodutiva, se expressando por diversas maneiras, através de diferentes táticas, como fecundação interna ou externa, diferenciação na idade de maturação, presença e/ou ausência de cuidado parental, entre outros fatores (Vazzoler 1996). Guilda ambiental caracteriza-se na forma como as espécies utilizam o local e qual o impacto que o mesmo tem sobre elas (Elliott et al. 2007b).

Apesar da existência de estudos voltados sobre a biodiversidade da ictiofauna estuarina do Brasil (Paiva et al. 2013a; Vilar & Joyeux 2018a), estes são geralmente pontuais e em reduzido número na região nordeste, (por exemplo Colares et al.,2016; Mérigot et al., 2017; Silva-Júnior et al., 2017; Ferreira et al., 2019), não refletindo a quantidade de ambientes estuarinos ao longo do litoral da região, indicando uma deficiência no conhecimento da composição ictiofaunística dos mesmos. Além da carência desse conhecimento, a maioria dos estudos realizados não contemplam uma abordagem funcional das comunidades ou parâmetros que permitam uma visão comparativa e integradas das mesmas.

De acordo com Cowman (2014) e Pinheiro et al. (2017), entender a biodiversidade e os padrões de endemismo são essenciais para o entendimento dos padrões geográficos e ecologia. Devido à importância que os sistemas estuarinos possuem na manutenção das populações ictiofaunísticas, o estudo sobre a organização funcional das comunidades são informações relevantes visando a conservação desses recursos renováveis, mitigação de impactos e aprimoramento do manejo destes locais (Karr 1991; Loebmann & Vieira 2005; Mouillot et al. 2007; Barletta et al. 2010).

Este trabalho, composto de dois artigos, tem o objetivo geral de compreender os padrões geográficos da ictiofauna estuarina do Nordeste do Brasil, através do conhecimento dos aspectos estruturais das assembleias e índices funcionais. O primeiro capítulo fornece uma síntese das informações sobre a ictiofauna estuarina de Pernambuco, Nordeste do Brasil, correlacionando com dados abióticos e caracterizando padrões geográficos. O segundo capítulo fornece uma síntese das informações disponíveis sobre a ictiofauna estuarina do Nordeste do Brasil, identificando e caracterizando padrões geográficos, também analisando as similaridades taxonômica entre os estuários.

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3. Artigo científico 1

3.1. Neotropical estuarine fishes of the Northeast Brazil (Pernambuco): ecology, conservation, and updated checklist

Neotropical estuarine fishes of Northeast Brazil (Pernambuco): ecology, conservation, and updated checklist

Rayssa Siqueira Lima[1], Flávia Lucena-Frédou[1], Júlio Guazzelli Gonzalez[1], Leandro Nolé Eduardo[1], Alex Souza Lira[2], Latifa Pelage[1], Valdimere Ferreira[1], Catarina Cardoso de Melo[1], Isabela Maria da Silva Araújo[1], Thierry Frédou[1], Ana Carla Asfora El-Deir[3], Beatrice Padovani Ferreira[4], Maria Elisabeth de Araújo[4] and William Severi[1].

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Abstract

Estuaries are productive environments and suppliers of many ecosystem processes, such as coastal protection and fisheries resources. However, while being severely impacted by anthropogenic

activities, information for their conservation is still fragmented and lacking, especially in tropical areas such as Brazil. Fish biodiversity and its relationship with abiotic variables in six estuaries of northeastern Brazil (Pernambuco) was analyzed. Based on 97 surveys (from 2000 to 2018), each fish species was classified according to its feeding mode, estuarine functional group, and IUCN conservation status at a regional level. A total of 197 fish species among 57 families were identified. Marine stragglers and migrants represented 80% of the species identified, while 70% of them were zoobenthivorous and piscivorous. Additionally, commercially important fishes and nine IUCN risk-categorized species were found. Together, these findings reinforce the role of estuaries in supporting coastal fish communities, including socioeconomically relevant and endangered species. Multivariate analysis evidenced taxonomic similarities in three groups: I- Sirinhaém, Santa Cruz Channel, and Rio Formoso; II- Jaguaribe; and III- Maracaípe and Suape, which were influenced by river mouth size, depth, and rainfall. Finally, a list of the main fish species was provided, highlighting the region highest biodiversity compared to estuaries at similar latitudes.

Resumo

Os estuários são ambientes produtivos e possuem diversos papéis para os ecossistemas associados. Apesar de serem severamente impactados, informações sobre conservação ainda são fragmentadas e carentes, especialmente em áreas tropicais como o Brasil. A ictiofauna estuarina de seis estuários de Pernambuco (Brasil) foi analisada e correlacionada com variáveis abióticas baseado em 97 coletas (de 2000 a 2018). As espécies foram classificadas de acordo com seu modo de alimentação, grupo funcional e status de conservação a nível regional (IUCN). Ao todo, 197 espécies de peixes entre 57 famílias foram identificadas. Marinhos visitantes e migrantes representaram 80% das espécies identificadas, enquanto zoobentívoros e piscívoros representaram 70%. Além disso, foram encontrados peixes de importância comercial e nove espécies classificadas pela IUCN como de risco. Juntas, estas descobertas reforçam o papel dos estuários no apoio às assembleias de peixes costeiros, incluindo espécies socioeconomicamente relevantes e ameaçadas de extinção. Análises multivariadas evidenciaram similaridades taxonômicas em três grupos: Sirinhaém, Canal Santa Cruz e Rio Formoso; Jaguaribe; e Maracaípe e Suape, que foram influenciados pelo tamanho da foz, profundidade e pluviosidade. Finalmente, foi fornecida uma lista das principais espécies de peixes, destacando a região estudada como a maior biodiversidade quando comparados com estuários em latitudes semelhantes.

Keywords, Palavras-chave

Keywords: Biodiversity, Coastal habitats, Fish assemblage, Guilds, IUCN

Palavras-chave: Assembleia de peixes, Biodiversidade, Guildas, Habitats costeiros, IUCN

Running Head

Estuarine fish species of Pernambuco (NE, Brazil)

Introduction

Estuaries are productive environments and suppliers of many ecosystem services, such as raw materials, coastal protection, nutrients recycling, fisheries resources, carbon sequestration, and tourism (Costanza et al. 2014; Boerema, Meire, 2017). These ecosystems are sources of income and food, being directly responsible for maintaining the daily lives of traditional populations worldwide (Barletta, Costa, 2009). They are also one of the most biologically valuable areas in the world (Costanza et al. 2014), providing essential habitats for the growth, feeding, and breeding ground of many fish species at different life stages (Elliott et al. 2007; Potter et al. 2015).

Estuarine fishes have an essential role in conducting energy throughout the trophic levels or exchanging energy with neighboring environments (Blaber, 2000; Potter et al. 2011). Different tools can be used to understand species distribution patterns and their functioning. Functional diversity and taxonomic richness are useful parameters for assessing the functionality, integrity, and resilience of estuarine ecosystems, which can also be expressed through ecological guilds, useful for the evaluation of the role of this ecosystem (Menge, Olson, 1990; Blaber, 2000; Elliott et al. 2007; Flores-Lopes et al. 2010; Contente, 2013).

The Brazilian coastline has over one hundred estuaries, with differential freshwater inputs, tidal regimes, and geomorphological characteristics (Dominguez, 2009; Bernadino et al. 2016). In Pernambuco state, northeast of Brazil, estuaries are highly threatened by deforestation, erosion, pollutants from industrial and agricultural discharge, sewage, and shrimp's farming. In addition, the lack of proper data hampers the assessment of the real impact of these activities and the elaboration of conservation policies (CPRH, 2001; Souza et al. 2007; Pelage et al. 2019).

There has been considerable progress in recent years regarding the knowledge on estuarine fishes of Pernambuco, with an increase in the number of publications on biodiversity (Ferreira et al. 2019), trophic ecology (Lira et al. 2018), functional diversity (Mérigot et al. 2017), contamination (Silva et al. 2018), population dynamics (Aschenbrenner, Ferreira, 2015), environmental connectivity (Falcão, 2012; Santana et al. 2018) and use of living resources (Barletta, Costa, 2009), even if it is still incipient compared to other regions of Brazil and the world (Whitfield 1994, 1999; Gillanders et al. 2011; James, Harrison, 2016; Nakayama et al. 2020). Moreover, for a long time,

most of the information has been scattered and limited to single estuaries, and/or restricted to the "grey literature" (*e.g.*, thesis, dissertations, monographs, abstracts, and technical reports) (Paiva, Araújo, 2010), with no integrated analysis or considering the abiotic estuarine characteristics. Physical and biological aspects can influence the patterns of species diversity and the interaction between its components (Fernandes, 2003).

The aquatic biodiversity is responsible for integrating the effects caused by different abiotic factors, being a good indicator of the ecosystem's health (Wannamaker, Rice, 2000). According to Whitfield, Elliot (2002), using fishes as bioindicators is important because they have a range of available information about their life history, including different species from various trophic levels, which can reflect on the effects of stressors within that studied ecosystem. However, one of the major bottlenecks in estuarine conservation policies is the lack of information on ecology and biophysical knowledge and the degree of fish dependence on such environments (Pikitch et al. 2004; Miloslavich et al. 2011). Such knowledge is essential to support management strategies, especially for threatened, endemic, or commercially targeted species (Vilar, Joyeux, 2018).

In this study, we provide ecological fish descriptors (richness, functional guilds, and risk of extinction) along six estuaries spread along the coast of Pernambuco, describing their relationship with environmental characteristics. Additionally, we compile a large dataset and provide a list of the main estuarine fishes of Pernambuco, comparing the biodiversity of this region with those estuaries at similar latitudes. This information is relevant to access changes that can be caused by anthropogenic impacts like fisheries, pollution, climate change, and management strategies and conservation of socially-economically important species.

Material and Methods

Sampling. The study area comprehends six estuaries located along the coastal region of Pernambuco state, northeastern Brazil: the estuarine complex of Santa Cruz channel and the estuary of Jaguaribe (north coast of Pernambuco) and Suape, Maracaípe, Sirinhaém, and Rio Formoso (south coast of Pernambuco) (Fig. 1). These estuarine systems exhibit different geomorphologies and are subject to distinct degrees of anthropogenic pressures (CPRH, 2003). Sampling in each area was carried out using passive (block nets) and active fishing gears (trawling and seine nets); between 2000 and 2018 (S. Tab. 2).

The estuarine complex of Santa Cruz channel is the larger estuarine ecosystem in the state. The substrate is from clay and silt to sand along with its connections with the adjacent sea (Silva, 2004; Teixeira, Galvincio, 2010; Albuquerque et al. 2019). The Jaguaribe estuary is 9 km long and

distinguishes it from the estuarine complex of Santa Cruz by discharging directly into the ocean, being restrained to the Itamaracá Island (Paiva et al. 2009; Lima et al. 2019). The right margin of this estuary is covered by small-sized mangroves and the anthropic action is evident by the withdrew of this vegetation for the construction of shrimp's farms (El-deir 2005; Lima et al. 2019). In this region, there is Marine Protected Areas (MPAs) that includes the municipalities of Itamaracá, Itapissuma, Igarassu, and Goiana.

In the south region, Suape was initially covered by a compact coastal rainforest including vast mangroves (Lima, Costa, 1978). However, this landscape suffered several impacts, owing to the rapid growth of sugar cane plantations. Four main rivers discharge into the bay of Suape, but their course, geomorphology, and hydrodynamics have changed after the construction of the Suape port (Muniz et al. 2005). The Maracaípe estuary is bordered by dense mangroves and sandbanks, and discharges near the Pontal de Maracaípe (CPRH, 2001; Paiva et al. 2009). Sirinhaém has a complex estuary with numerous islands, lagoons, and extensive mangrove forest (CPRH, 2001). Rio Formoso estuary is formed by channels, tidal creeks, sandbanks, dense mangroves, and reefs near the coastline acting as natural barriers (Paiva et al. 2009; Lima et al. 2019). The municipality where it is located is part of the two implemented Marine Protected Areas (MPAs): Guadalupe and Costa dos Corais. Abiotic factors that may influence the distribution of species were considered in this study (Tab. 1).

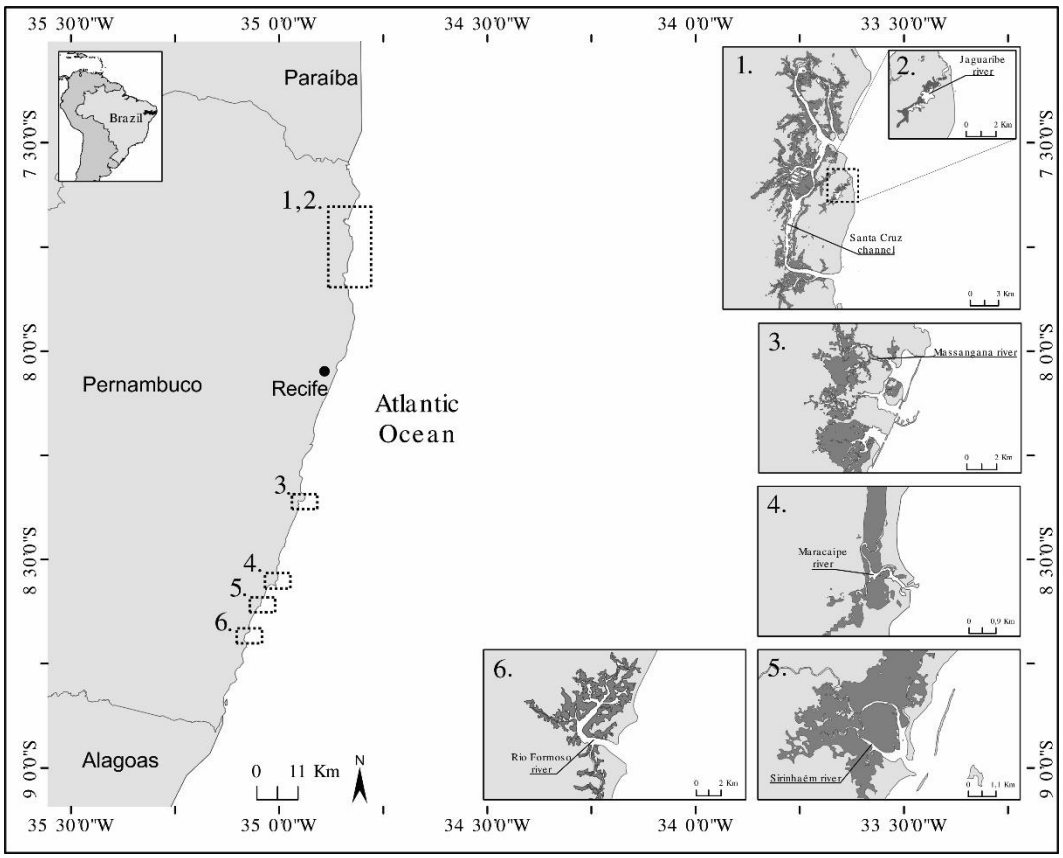

Figure I. Estuaries of Santa Cruz Channel (1), Jaguaribe (2), Suape (3), Maracaípe (4), Sirinhaém (5) and Rio Formoso (6) located in northeast Brazil. Mangrove cover is shown as darker grey areas in each panel.

Table I: Morphologic features of estuarine systems addressed in the study; northeast Brazil used in the analysis (adapted from Gonzalez et al. (2019).

Characteristics	Estuary					
	Santa Cruz	Jaguaribe	Suape	Maracaípe	Sirinhaém	Rio Formoso
Type	Ria	Coastal Plain	Coastal Lagoon	Coastal Plain	Coastal Plain	Coastal Plain
Estuarine area (km²) †	73.5	2.15	29.7	5.5	18.7	27.7
Vegetated area (km²) †	48.0	1.0	23.1	5.0	17.0	19.9
Watershed area (km²) †	25.5	1.15	6.6	0.5	1.7	7.8
Depth (m)	3	1.5	3.1	1.4	2.6	4.7
Mouth width (km) †	0.90	0.10	0.28	0.16	0.60	1.07
Numb. of mouths	2	1	1	1	1	1
Tide (mean)	1.4	2.5	3	1.5	1.2	1.5
Precipitation (2000-2018) (mean - mm)	127.7	127.7	171.8	156.8	181.9	141.2
Source	Flores Montes et al. 1998; Medeiros et al. 2001; Silva et al. 2003; Silva et al. 2011; Lana, Bernardino, 2018; APAC, 2020	Silva et al. 2011; APAC, 2020	Borges, 2011; Silva et al. 2011; Cordeiro et al. 2019; APAC, 2020	Bastos et al. 2011; Silva et al. 2011; Favero et al. 2019 ; APAC, 2020	Mello, 2009 ; Silva et al. 2009 ; Silva et al. 2011 ; APAC, 2020	Honorato da Silva et al. 2004; Silva et al. 2011; Lima, 2016; APAC, 2020

† Data obtained with ArcGis 10.1 based on satellite images LANDSAT 7. Type - geomorphological classification of estuaries according to Pritchard (1952). The estuary's area is considered the sum of the watershed and vegetated areas. Depth - mean depth during low tide. Mouth width - width of the

connection to the sea; mean width was considered when the estuary exhibits more than one connection to the sea. Numb. of mouths - number of connections to the sea. Tide – mean tide reported for all areas.

Data collection. The species were identified following dichotomous keys such as Araújo et al. (2004), Carpenter et al. (2003) and Figueiredo, Menezes (1980, 2000). Species richness was presented according to the systematic organization proposed by Nelson et al. (2016) with 3 levels: order, family, and species. The nomenclature of species was revised through the Eschmeyer Fish Catalogue and, when necessary, specific literature (Fricke et al. 2020). Fish species were analyzed as presence/absence data and classified to their use of estuaries based on the functional guild approach (Elliott et al. 2007).

Statistical analyses. The Estuarine Use Functional Group (EUFG) represents the use of estuaries and adjacent environments by a species over its life cycle and was classified as marine stragglers (MS), marine migrants (MM), estuarine (ES) or freshwater species (FS). The Feeding Mode Functional Group (FMFG) categorizes the feeding habit of a species: detritivore (DV), herbivore (HV), zooplanktivore (ZP), zoobenthivore (ZB), omnivore (OV), piscivore (PV), and opportunist (OP). An extensive literature review based on articles, books, and reports totalizing more than 200 references was used to define the functional guilds classification (S. Tab. 1 see Franco et al. (2008) for a detailed description of each category).

Species were assigned a conservation status according to the categories based in the International Union for Conservation of Nature (IUCN) Red List criteria of threatened species, categorized at Brazilian level (ICMbio 2018) in 10 categories: extinct (EX), regionally extinct (RE), extinct in the wild (EW), critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

Functional guilds (EUFG and FMFG) proportions (% of species) were graphically displayed through a heatmap (estuaries x guild proportion) along with an Agglomerative Hierarchical Cluster (AHC) performed using the Ward's minimum variance method based on a Euclidian distance matrix. The linear correlation between the cophenetic and Euclidean distance matrix was calculated to validate the chosen cluster method (Pearson correlation > 0.8). These analyses were used aiming to see the similarity between estuaries based on the use of the estuary by the species as well as their feeding behavior.

A principal components analysis (PCA) was used to analyze associations between the environmental variables (Tab. 1) and the estuaries. In addition, to investigate the similarities among the fish assemblages and estuaries, a Non-metric Multidimensional Scaling (nMDS) using a Sorensen similarity matrix from species presence/absence data was performed as a cluster analysis using the average linkage method. To determine the subset of abiotic variables linked to the fish community structure, a BioEnv analysis was carried out (Oksanen et al. 2009). All data were standardized. A permutational multivariate analysis of variance (PERMANOVA) was used to test richness differences among estuaries (Clarke, Warwick, 2001). All statistical analyses were performed using the vegan (Oksanen et al. 2019), ggplot2 (Wickham, 2016), and stats (R Core, 2019) packages from R Core Team (2020).

Results

A total of 197 fish species, distributed in 30 orders and 57 families were identified in the studied estuaries (Tab. 3). Sciaenidae was the most diverse family, comprehending 13 species, followed by Carangidae (12 species), Engraulidae (11), and Gobiidae (11). The remaining families had less than 10 species each. The estuarine complex of Santa Cruz channel exhibited higher species richness than the other estuaries, with 107 species, followed by Rio Formoso (90 species), Maracaípe (88), Sirinhaém (85), Suape (83), and Jaguaribe (72). Twenty-two species were recorded in all locations: *Achirus lineatus*, *Anchovia clupeoides*, *Archosargus rhomboidalis*, *Bairdiella ronchus*, *Caranx latus*, *Centropomus parallelus*, *C. undecimalis*, *Chaetodipterus faber*, *Diapterus auratus*, *D. rhombeus*, *Eucinostomus argenteus*, *E. melanopterus*, *Eugerres brasilianus*, *Harengula clupeola*, *Hyporhamphus unifasciatus*, *Lutjanus alexandrei*, *L. jocu*, *Mugil curema*, *Oligoplites saurus*, *Sphoeroides testudineus*, *Sphyraena barracuda* and *Strongylura timucu*.

Most fishes (79.8%) were classified as Least Concern according to the ICMbio conservation status (Tab. 3). However, nine species were identified under some degree of threat: one as CR (*Epinephelus itajara* (Rio Formoso)) and nine as VU (*Achirus mucuri* (Sirinhaém), *Hippocampus erectus* (Santa Cruz Channel, Suape and Maracaípe), *Hippocampus reidi* (Maracaípe and Rio Formoso), *Megalops atlanticus* (Jaguaribe, Sirinhaém, and Rio Formoso), *Mycteroperca bonaci* (Santa Cruz Channel), *Lutjanus cyanopterus* (Jaguaribe, Sirinhaém, Maracaípe, and Rio Formoso), *Sciades parkeri* (Sirinhaém), and *Sparisoma axillare* (Suape and Rio Formoso)). It was also observed nine species classified as NT: *Balistes vetula* (Maracaípe), *Cynoscion acoupa* (Sirinhaém), *Hyporhamphus unifasciatus* (in all studied estuaries), *Mugil liza* (Santa Cruz Channel, Jaguaribe, Suape, Maracaípe and Rio Formoso), *Lutjanus analis* (Santa Cruz Channel and Suape),

L. jocu (in all studied estuaries), *L. synagris* (Santa Cruz Channel, Jaguaribe, Suape and Rio Formoso), *Ocyurus chrysurus* (Rio Formoso), and *Sparisoma amplum* (Jaguaribe). In addition, eighteen species were recognized as DD (Tab. 3).

Fish species exhibited a strong affinity to the marine ecosystem, most of them belonging to the categories marine stragglers (46.6%) and marine migrants (32.3% of the total number of species) (S. Tab. 1, Fig. 2), a pattern observed in every estuary. The contribution of marine stragglers and marine migrants to the overall fish composition varied between 75 to 79% among estuaries. Estuarine species were 20.5% of the total number and only one freshwater species (*Poecilia vivipara*) was observed in one of the studied locations (Jaguaribe).

Most of the species fed on invertebrates associated to the substrate (*i.e.* zoobenthivorous, 50.7%), followed by piscivorous (21.4%) and zooplanktivorous fishes (10.4%; Supplementary Material Tab. 1) in all estuaries. This pattern of feeding habits was observed for each estuary alone, with small differences between them and, whenever present, it was associated to variations in the number of species in the detritivore, zooplanktivore, and omnivore categories (Fig. 3).

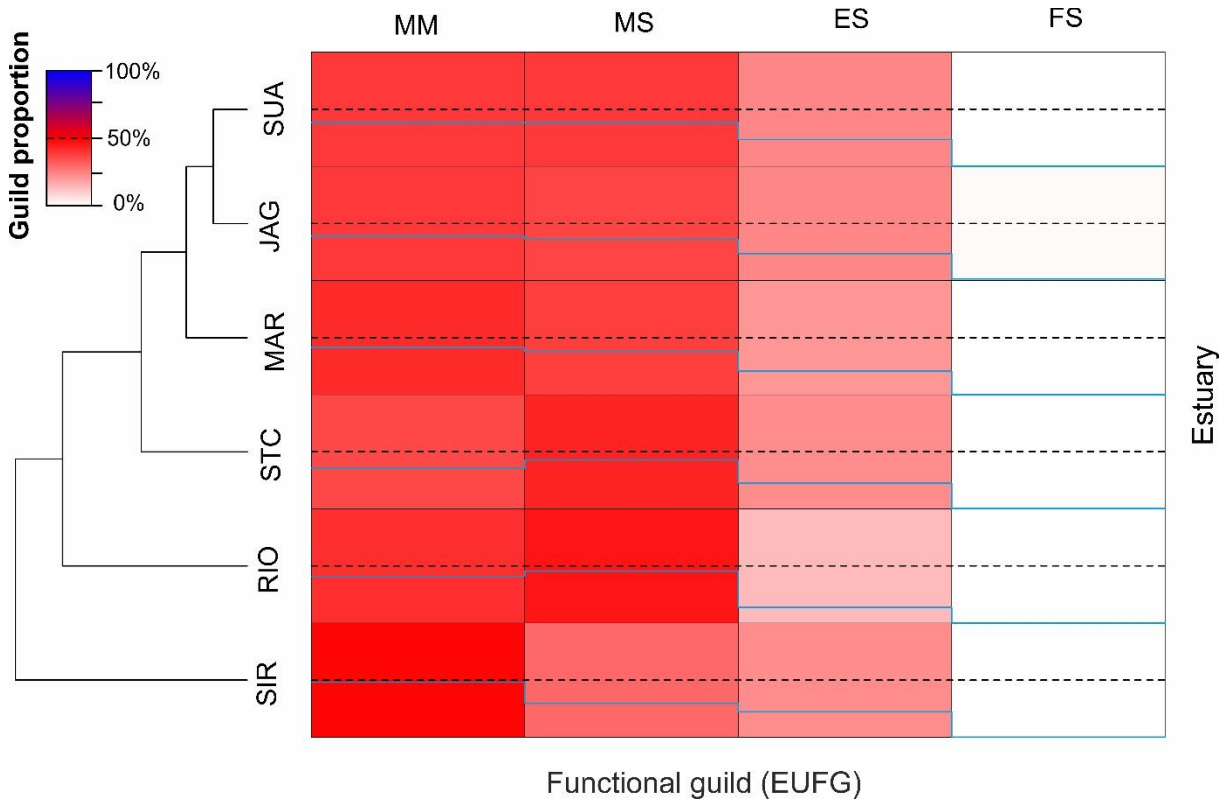

Figure II. Percentage of each EUFG category marine migrant (MM), marine stragglers (MS), estuarine fishes (ES) and freshwater species (FS) for the estuaries of Sirinhaém (SIR), Rio Formoso (RIO), Santa Cruz channel (STC), Maracaípe (MAR), Jaguaribe (JAG) and Suape (SUA) located in

northeast Brazil. Blue line: percentage of each category within the estuaries. Dotted line: 50 percentage of the total number.

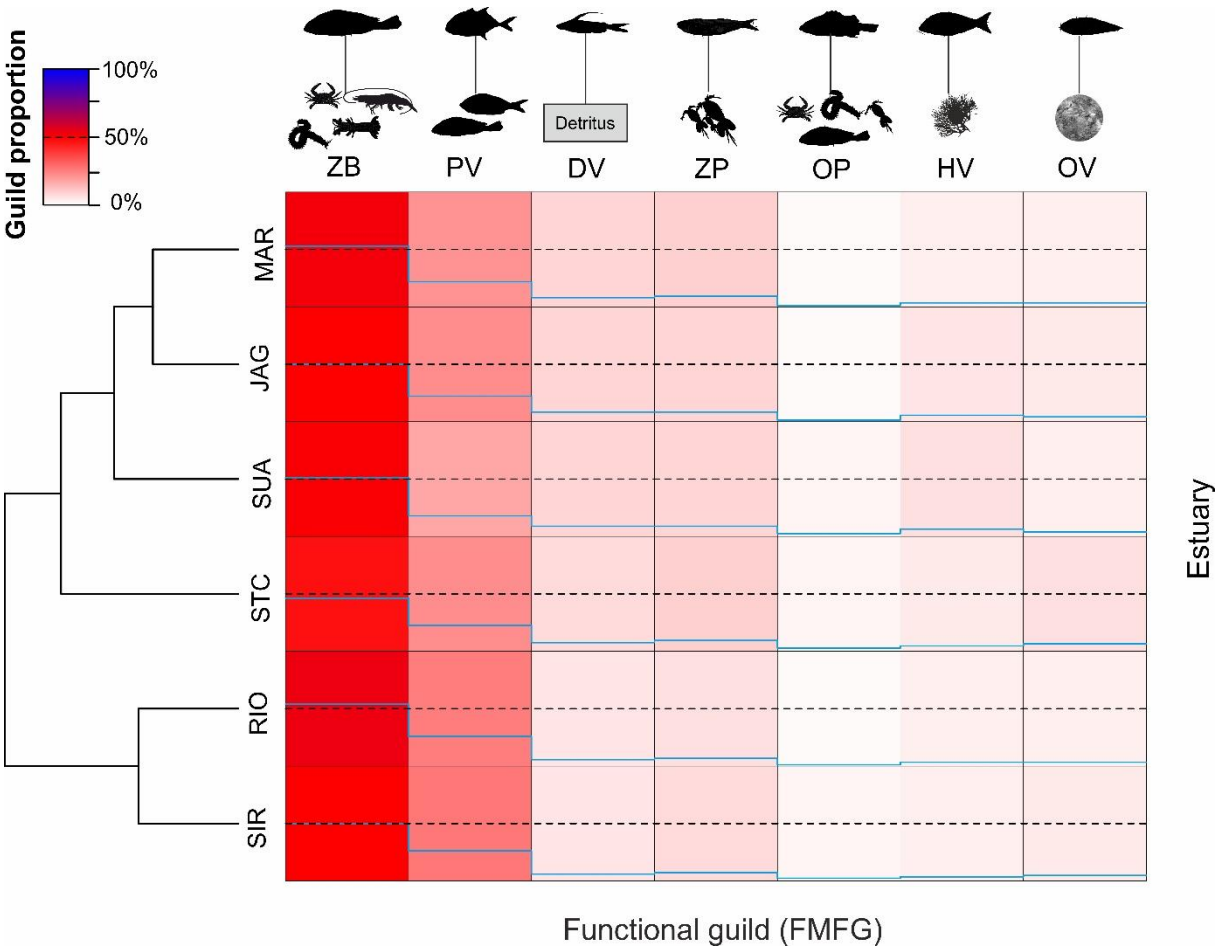

Figure III. Percentage of each FMFG category zoobenthivore (ZB), piscivore (PV), zooplanktivore (ZP), herbivore (HV), omnivore (OV), detritivore (DV) and opportunistic (OP) for the estuaries of Sirinhaém (SIR), Rio Formoso (RIO), Santa Cruz channel (STC), Maracaípe (MAR), Jaguaribe (JAG) and Suape (SUA) located in northeast Brazil. Blue line: percentage of each category within the estuaries. Dotted line: 50 percentage of the total number.

A total of 76.5% of the variance was explained by the two first axis (PC1 – 58.5% and PC2 – 17.9%) of the PCA analysis. The greater proportion of explanation for the PC1 was related to three variables (watershed, estuarine and vegetated areas) that are positively associated with the Santa Cruz Channel's estuary. At the same time, mouth width and depth are positively linked to the Rio Formoso estuary. On the other hand, the tide and precipitation variables have little contribution to the explanation of PC1 being negatively correlated with the estuaries of Santa Cruz channel and Rio Formoso in overall. In the PC2, the largest contribution is related to the variables tide (PC2;

eigenvalues= 0.48) associated with the estuaries of Jaguaribe and Suape, and the precipitation (PC2; eigenvalues= -0.57) to Maracaípe and Sirinhaém (Fig. 4).

The nMDS and the Cluster analysis (Fig. 5) showed similar results, both based on the taxonomic composition of each estuary correlated with the abiotic data. The cluster analysis exhibited three groups with a resemblance level of 41%, which showed a significant difference between the Jaguaribe estuary and the other ones. Also, it is possible to distinguish the formation of two groups: the first one comprised the estuaries of Santa Cruz, Rio Formoso, and Sirinhaém, and the second one, Maracaípe, and Suape. The nMDS plotted with the abiotic characteristics (Fig. 5) showed the relationship between these attributes and the patterns observed in the cluster analysis (Fig. 5), evidencing that the Jaguaribe estuary differed from the other estuaries mainly by the tide. The BioEnv showed that the best correlation within the abiotic and biotic characteristics was between tide and precipitation (Tab. 2).

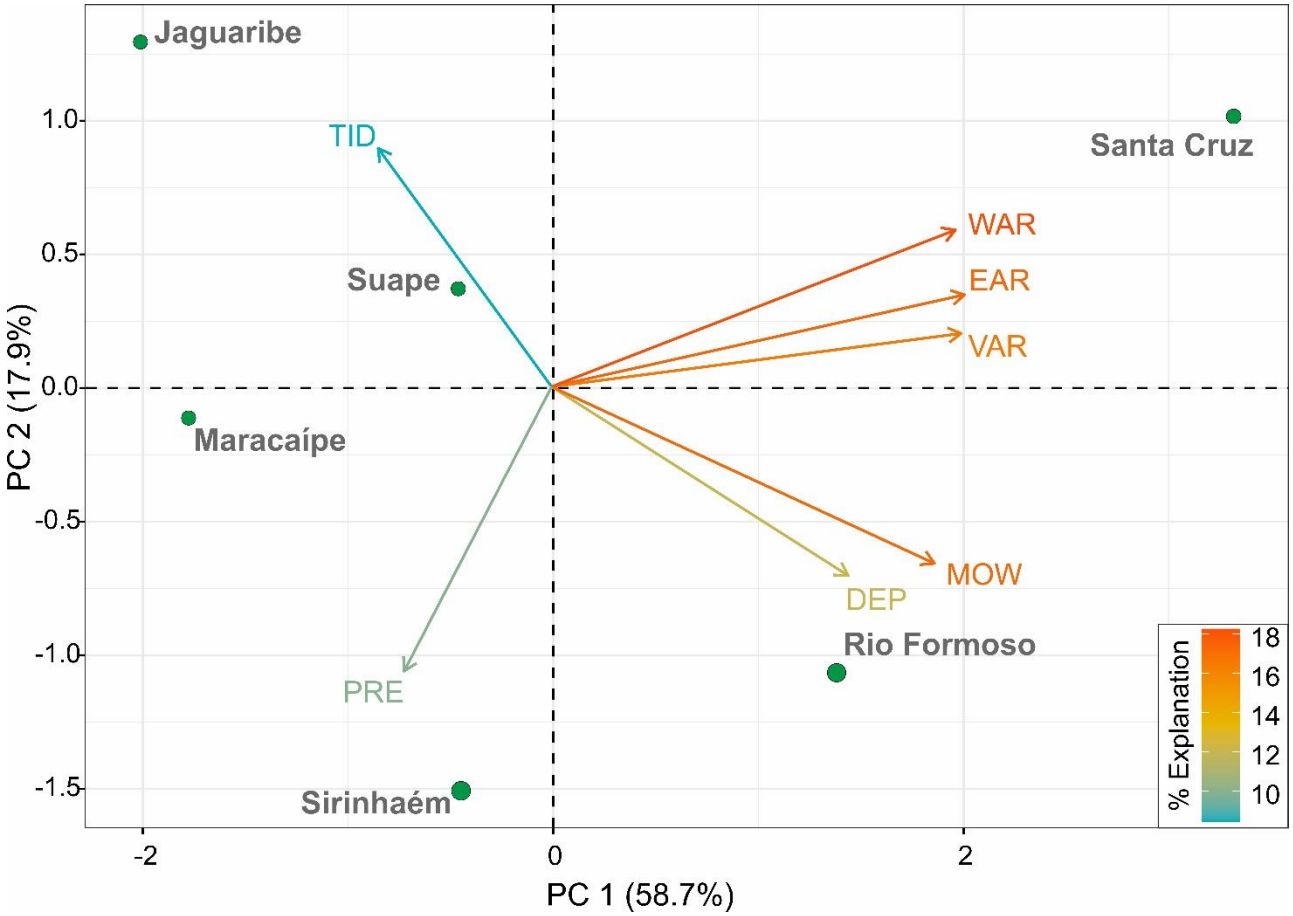

Figure IV. Principal components analysis (PCA) based on abiotic data of each estuary. TID: tide; PRE: precipitation; WAR: watershed area; EAR: estuarine area; VAR: vegetated area; MOW: mouth width; DEP: depth

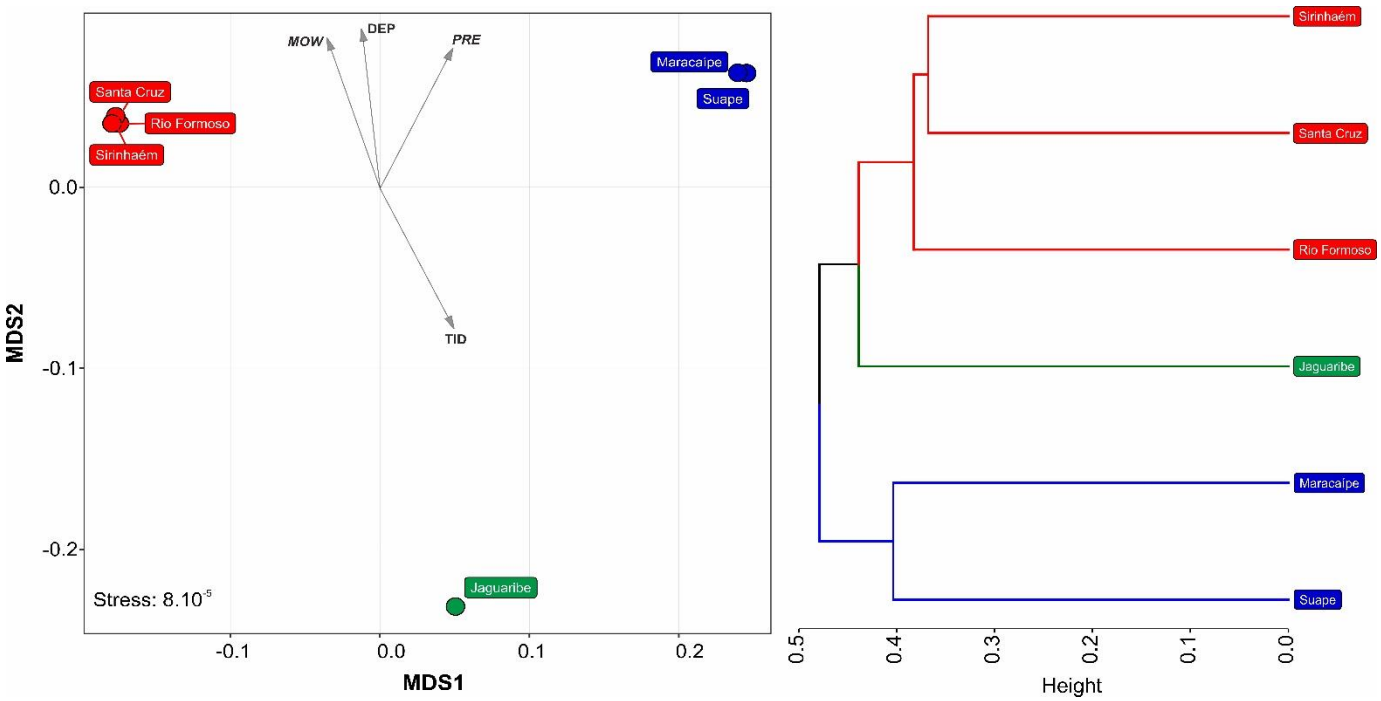

Figure V. Non-metric Multidimensional Scaling (nMDS) based on species records and abiotic characteristics of the estuaries and a cluster analysis based on species records by estuaries. MOW: mouth width; DEP: depth; PRE: precipitation; TID: tide

Table II: Results from the BioEnv – Abiotic and Biotic Matrixes

* Best correlation	Size	Correlation
Tide and Precipitation*	2	0.5079
Tide	1	0.3790
Depth; Tide and Precipitation	3	0.2439
Depth; Mouth Width; Tide and Precipitation	4	0.0409

Discussion

Among several definitions, estuaries have been commonly regarded as partly enclosed areas with a free connection with the open sea, creating salinity gradients along the mixing zone (Able, Fahay,

2010). Estuaries provide a wide diversity of habitats and wildlife with significant commercial and recreational benefits for the population (Blaber, 2000). They are highly susceptible to different variations in chemical or physical factors, which may affect the composition and distribution of local assemblages and critical transitional areas for the ichthyofauna (Blaber, 2000; Ray, 2005; Favero et al. 2019).

Pernambuco has around fifteen estuaries along its coast (Silva et al. 2011; Pelage et al. 2019), where six of the most productive are investigated in this present study. Based on our findings, the estuarine ichthyofauna of Pernambuco is rich and diverse, with the occurrence of 197 species and 57 families. Other studies analyzed or compiled information about the estuaries in Pernambuco: Vasconcelos Filho, Oliveira (1999) studied a single estuary and observed 145 species; Mérigot et al. (2017) in four estuaries reported 122 species, and Paiva, Araújo (2010) analyzed 17 estuaries, found a similar number (210) and dominance of species to the present study. Nonetheless, the number of species observed in adjacent areas such as Mamanguape estuary (Paraíba, Brazil, 66 species and 33 families; Medeiros et al. 2018) and Santo Antônio River estuary (Alagoas, Brazil, 34 species and 16 families; da Silva et al. 2018). The variation found in the species number observed at these locations may be attributed to the variability on estuary's size and sampling strategies, as well as some possible divergence in taxonomic classification. Some common families such as Mugilidae are speciose and species composition has only recently been revised (Menezes et al. 2015).

The use of multiple fishing gear can improve the catch of species and thus the observed image of biodiversity (Gotelli, Colwell, 2011). Therefore, to provide a piece of robust information on the estuarine biodiversity of Pernambuco, we combined information of multiple fishing gears (passive and active) used in different habitats, such as channels, flooded mangroves, shallow coastal areas, and sand or mud banks.

Abiotic conditions of the estuaries also play an essential role in the fish assemblage. The studied estuaries totalized 158 km of extension and have different sizes and morphology, relatively smaller compared to other Brazilian estuaries. For instance, the largest estuary in the state of Pernambuco (Santa Cruz) covers an area of approximately 73.5 km² and exhibits a total number of 107 species. On the other hand, for one of the largest estuaries in northeast Brazil, the Jaguaribe – Ceará, with an area of approximately 641,216 km^2, only 129 species have been reported (ZEE, 2005; Costa, 2013). Such richness found in Pernambuco can be explained by their different areas and habitats (Ferreira et al. 2019).

Among the estuaries of Pernambuco, the most common fish species are mullets (Mugilidae), catfishes (Ariidae), jacks (Carangidae), snooks (Centropomidae), and anchovies (Engraulidae) (Lessa et al. 2006; Lira et al. 2018). The present study found 22 common species between all studied sites mainly belonging to Gerreidae (5), Engraulidae (2), Carangidae (2) and Centropomidae (2), similar to what it was reported in the same estuaries or nearby ones: Castro (2001) (Paciência River, Maranhão); Paiva et al. (2008) (Rio Formoso, Pernambuco); Neta and Castro (2008) (Ilha de Caranguejos, Maranhão); Lira et al. (2018) (Sirinháem estuary, Pernambuco); Favero et al. (2019) (Maracaípe estuary, Pernambuco) and Ferreira et al. (2019) (Itapissuma/Itamaracá complex, Pernambuco). However, three clusters divided the studied estuaries based in the fish community. The first group was Sirinhaém, Rio Formoso, and Santa Cruz, while the second was formed by Jaguaribe estuary and the third by Suape and Maracaípe. The climate pattern has a higher potential to control biological community dynamics (Vasconcelos et al. 2015; Fujiwara et al. 2019). The precipitation was larger in the south area (Sirinhaém, Rio Formoso, Suape and Maracaípe) than in the north area (Santa Cruz and Jaguaribe) and, according to our BIOENV data, in general, the fish assemblage was correlated mainly with the precipitation and tide patterns. The control of rainfall is not only driven by the increased freshwater inflow, but also by indirect processes like a high concentration of nutrients and consequently the highest primary productivity (PP) during the rainy seasons (Caffrey et al. 2007; Parizzi et al. 2016). The effect of the rainfall in regions of minor tidal variations may favor the development of the PP and consequently in the biotic community (Bucci et al. 2012). This can be observed in the estuaries of Sirinhaém, Rio Formoso, and Santa Cruz. Although these estuaries have morphological structure differences and dimensions, the rainfall rates and/or the reduced tidal variations were considered crucial in defining the species richness.

The results discussed in the previous paragraph were different from what reported by Vorwerk et al. (2003), which attested that the mouth size of an estuary mainly influences the structure of a fish assemblage in an estuary. According to Kuparinen et al. (2009) and Bezerra et al. (2012), lunar cycles can directly influence the tide changes, affecting the feeding behavior and movement of fishes, such as their vertical distribution. The river flow may also drive fish assemblages since it maintains the detrital and nutrient inputs into estuaries, preventing hypersaline conditions and providing a favorable environment to these species (Blaber, Blaber, 1980; Whitfield, 1994; Meynecke et al. 2006). The size of an estuary can also directly influence the fish assemblages (Mérigot et al. 2017). Jaguaribe is the smallest one in terms of extension and mangrove coverage within all the assessed estuaries. Also, it is known to have suffered strong siltation processes in its

mouth over time (Silva-Falcão et al. 2007), reducing its depth and making it difficult to exchange fresh and seawater, therefore, potentially decreasing the diversity of marine species. The lowest species richness was reported in the Jaguaribe estuary.

Suape and Maracaípe had a higher number of common species (52 species), thus, forming the last cluster. However, these estuaries also had exclusive species. Morphologically, these estuaries are different, and their rivers have a low potential for water discharge (Bastos et al. 2011). Maracaípe is a coastal plainland river with an open estuary and a direct connection to a coral reef barrier. Therefore, reef specie, such as *Acanthurus bahianus*, *Balistes vetula*, and *Pomacanthus paru* are more frequent and thus represented the catches. On the other hand, Suape is a coastal lagoon that suffered a high deforestation impact due to the construction of a large industrial port complex (chemical, shipping, and logistics companies), with predictable adverse effects on biodiversity and fisheries productivity (Paiva, Araújo, 2010). However, this was not reflected in the total observed species richness, which was high (83 species), similar to the other estuaries.

The guild approach, particularly the trophic and estuarine use guilds, have been widely applied for understanding the structure and functioning of aquatic ecosystems, the movement pattern between environments, and their use as feeding, breeding, or development grounds (Elliott et al. 2007; Passos et al. 2013). In this study, most species were marine stragglers and migrants, given the permanent connection between the estuaries and the Atlantic Ocean over the year (Andrade-Tubino et al. 2008). Moreover, marine stragglers and migrants are commonly represented along estuaries around the world (Franco et al. 2008), since estuaries have an essential role as breeding areas, and fish use these environments to spawn, to complete their life cycles, or even to do migratory movements (Vendel, Chaves, 2006).

According to Duarte, Andreata (2003), the type of sediment found in an estuary has a huge influence in the distribution and regulation of organisms and their community. Demersal fishes have unique importance in marine ecosystems due to their feeding and reproductive behavior being correlated with the benthic ecosystem. Furthermore, the zoobenthivores fishes perform a critical role within the primary consumers and the higher levels found in the food web, which can be explained by a high abundance of benthic fauna (Silva, 2013; Passarone et al. 2019). Benthos is largely mainly responsible for structuring the food web and having an important role in the system dynamics (Herman et al. 1999). Benthivores dominate in all types of estuaries (Blaber, 2000).

Most of the species reported in the estuaries of Pernambuco were classified as least concern (LC) according to the IUCN conservation status. However, important commercial species were classified

as vulnerable (VU), near threatened (NT), data deficient (DD), or even not evaluated (NE). The estuary of Rio Formoso presented most of the species (24) classified within the previously mentioned categories. Within the important commercial species, additional attention should be given to *E. itajara* (CR), since it is under an active fishing prohibition until 2023 (Pereira 2018); and to *Megalops altanticus* (VU), *Lutjanus cyanopterus* (VU), *M*ugil *liza* (NT), *Hyporhamphus unifasciatus* (NT) and *Mycteroperca bonaci* (VU), given their economic importance (Lessa and Nóbrega 2000; Gaspar 2006; Falcão 2007; Favero et al. 2019). *Sphoeroides testudineus* (DD), *Pomacanthus arcuatus* (DD), and *Pomacanthus paru* (DD) are notable components of coral reefs and seagrass ecosystems (Marty, 2014; Eduardo et al., 2018; Eduardo et al. 2020) and exemplifies poorly studied species deserve further attention for conservation and management, even though they are not considered threatened species.

Currently, most results about the biodiversity found in estuaries worldwide are still restricted to ´grey literature´ or scattered into different data types (Blaber, 2000; König et al. 2019). Compiling this data is important not only to improve access to information, but also to carry out integrated studies that allow understanding the taxonomic and functional variation and how estuaries provide advantages for the protection and development of species (Medeiros et al. 2001; König et al. 2019). A compilation of the fish biodiversity found at six of the most productive estuaries in Pernambuco and its correlation between some abiotic characteristics were provided, focusing on the contribution to fisheries management and the conservation of the ichthyofauna. Our findings indicate that the Santa Cruz Complex had the highest species richness, while Jaguaribe had the lowest. Even though the abiotic characteristics morphology and size are significant, the variables precipitation and tide range were crucial to identify richness patterns within the studied estuaries. Also, estuarine fish assemblages mainly comprise species that spend only part of their lives in the estuaries, mainly feeding on benthic invertebrates. This reinforces the contribution role of marine waters in maintaining the biodiversity in estuaries and how possible changes in morphology or weather patterns can affect the estuaries showing its connectivity.

Estuaries consist of biologically varied subsystems, one of the most natural and productive systems in the biosphere (Dame, 2008). Although it is considered resilient, this ecosystem is affected by changes in marine or terrestrial environments, such as variations in wind patterns, evaporation, precipitation, and temperatures, which may significantly impact species distribution and assemblages (James et al. 2013). Even though the estuaries in Pernambuco are highly compromised because of the daily impacts like aquaculture and industries (Santa Cruz), port (Suape), and sugarcane plantation (Sirinhaém), they still have a high ichthyofaunal richness.

However, the functionality and the dominance of fishes can be altered because of the direct anthropogenic impacts, which changes the geomorphology and hydrodynamic conditions of the areas and alters the number and composition of species (Kennish, 2005; Pelage et al. 2019), hence the necessity of the validation of environmental degradation in monitoring programs.

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Author contributions

RSL, JGG, LNE, ASL, LP, VF, CC, and IMSA conducted the sampling and laboratory analysis; RSL, JGG and ASL performed the statistical analysis; RSL, ASL, JGG, VF, LP and CCM prepared the figures and tables; BP, MEA and ACAE contributed with data from some of the estuaries; and RSL, ASL, JGG, LNE, FLF, TF, BP and WS wrote the manuscript.

Table III: List of fish species recorded in six estuaries in north-eastern Brazil, along with their conservation status (IUCN list) and respective feeding mode (FMFG) and estuarine use (EUFG) functional groups (Elliot et al., 2007). Estuaries: Santa Cruz channel (STC), Jaguaribe (JAG), Suape (SUA), Maracaípe (MAR), Sirinhaém (SIR) and Rio Formoso (RIO). IUCN classification: NE - not evaluated; DD - data deficient; LC - least concern; VU - vulnerable; NT - near threatened; CR - critically endangered; feeding mode functional groups (FMFG): ZB - zoobenthivore; PV - piscivore; ZP - zooplanktivore; HV - herbivore; OV - omnivore; DV - detritivore; OP - opportunistic, estuarine use functional group (EUFG): MM - marine migrants; MS - marine straggler; ES - estuarine species; FS - freshwater species.

Order	Family	Species	IUCN †	FMFG ‡	EUFG ‡	Estuary					
						STC	JAG	SUA	MAR	SIR	RIO
Myliobatiformes	Dasyatidae	*Hypanus americanus* (Hildebrand & Schroeder, 1928)	DD	ZB	MM						X
		Hypanus guttatus (Bloch & Schneider, 1801)	LC	ZB	MS	X	X			X	X
Elopiformes	Elopidae	*Elops saurus* Linnaeus, 1758	NE	PV	MS	X	X				
		Megalops atlanticus Valenciennes, 1847	VU	PV	MM		X			X	X
Albuliformes	Albulidae	*Albula vulpes* (Linnaeus, 1758)	DD	ZB	MM		X		X		X
		Gymnothorax funebris Ranzani, 1839	DD	ZB	MS		X			X	X
		Gymnothorax ocellatus Agassiz, 1831	DD	ZB	MS	X					
Anguilliformes	Ophichthidae	*Ahlia egmontis* (Jordan, 1884)	LC	ZB	MS			X			
		Myrichthys ocellatus (Lesueur, 1825)	LC	ZB	MS	X					X
		Myrophis punctatus Lütken, 1852	LC	ZB	MM		X		X		
		Ophichthus cylindroideus (Ranzani, 1839)	LC	PV	ES				X		
		Ophichthys ophis (Linnaeus, 1758)	LC	PV	MS				X		
	Congridae	*Ariosoma balearicum* (Delaroche, 1809)	LC	-	MS			X			
Clupeiformes	Pristigasteridae	*Chirocentrodon bleekerianus* (Poey, 1867)	LC	ZB	MS	X					
	Engraulidae	*Anchoa filifera* (Fowler, 1915)	LC	ZB	ES			X			
		Anchoa januaria (Steindachner, 1879)	LC	ZP	ES			X		X	
		Anchoa lyolepis (Evermann & Marsh, 1902)	LC	ZP	MS	X					
		Anchoa marinii Hildebrand, 1943	LC	ZP	MS	X					
		Anchoa spinifer (Valenciennes, 1848)	LC	PV	MM	X		X	X	X	
		Anchoa tricolor (Spix & Agassiz, 1829)	LC	ZB	MM	X		X	X	X	
		Anchovia clupeoides (Swainson, 1839)	LC	ZP	MM	X	X	X	X	X	X
		Anchoviella lepidentostole (Fowler, 1911)	LC	ZB	MM		X		X		
		Cetengraulis edentulus (Cuvier, 1829)	LC	ZP	MM	X			X	X	X
		Engraulis anchoita Hubbs & Marini 1935	LC	ZP	MS	X					
		Lycengraulis grossidens (Spix & Agassiz, 1829)	LC	PV	ES	X	X	X		X	X
	Clupeidae	*Harengula clupeola* (Cuvier, 1829)	LC	ZP	MS	X	X	X	X	X	X
		Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)	LC	HV	MM	X	X	X	X	X	
		Opisthonema oglinum (Lesueur, 1818)	LC	ZP	MS	X	X			X	X
		Platanichthys platana (Regan, 1917)	LC	ZP	ES	X		X			
		Rhinosardinia bahiensis (Steindachner, 1879)	LC	ZP	ES	X					
	Ariidae	*Aspistor luniscutis* (Valenciennes, 1840)	LC	OV	MS	X				X	
		Aspistor quadriscutis (Valenciennes, 1840)	LC	ZB	MS					X	
		Cathorops agassizii (Eigenmann & Eigenmann, 1888)	LC	ZB	ES	X				X	X
		Cathorops spixii (Agassiz, 1829)	LC	ZB	ES				X	X	
		Notarius grandicassis (Valenciennes, 1840)	LC	ZB	MM					X	
		Sciades herzbergii (Bloch, 1794)	LC	ZB	ES	X				X	X
		Sciades parkeri (Traill, 1982)	VU	ZB	ES					X	
		Sciades proops (Valenciennes, 1840)	DD	ZB	ES						X

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Aulopiformes	Synodontidae	*Synodus foetens* (Linnaeus, 1766)	LC	PV	MS	X		X	X			
Holocentriformes	Holocentridae	*Holocentrus adscensiones* (Osbeck, 1765)	LC	ZB	MS			X				
Batrachoidiformes	Batrachoididae	*Batrachoides surinamensis* (Bloch & Schneider, 1801)	LC	ZB	MS	X						
		Thalassophryne nattereri Steindachner, 1876	LC	ZB	MS	X	X	X	X			X
Kurtiformes	Apogonidae	*Phaeoptyx pigmentaria* (Poey, 1860)	LC	ZP	MS			X				
Gobiiformes	Eleotridae	*Eleotris pisonis* (Gmelin, 1789)	LC	PV	ES							X
		Erotelis smaragdus (Valenciennes, 1837)	LC	-	ES			X				
		Guavina guavina (Valenciennes, 1837)	LC	ZB	ES	X	X				X	X
	Gobiidae	*Bathygobius soporator* (Valenciennes, 1837)	LC	PV	ES	X	X	X	X			
		Ctenogobius boleosoma (Jordan & Gilbert, 1882)	LC	DV	ES	X	X	X	X	X		
		Ctenogobius saepepallens (Gilbert & Randall, 1968)	LC	ZB	MS			X				
		Ctenogobius shufeldti (Jordan & Eigenmann, 1887)	LC	OV	ES	X						
		Ctenogobius smaragdus (Valenciennes, 1837)	LC	DV	ES	X	X	X				
		Ctenogobius stigmaticus (Poey, 1860)	LC	DV	ES	X						
		Evorthodus lyricus (Girard, 1858)	LC	DV	MS	X						
		Gobioides broussonnetii Lacepède, 1800	LC	DV	ES				X			
		Gobionellus oceanicus (Pallas, 1770)	LC	DV	ES	X	X		X	X		X
		Gobionellus stomatus Starks, 1913	LC	DV	ES	X	X	X				
		Microgobius meeki Evermann & Marsh, 1899	LC	ZB	MS	X						
Mugiliformes	Mugilidae	*Mugil brevirostris* (Ribeiro, 1915)	NE	-	MM			X				
		Mugil curema Valenciennes, 1836	DD	DV	MM	X	X	X	X	X		X
		Mugil curvidens Valenciennes, 1836	DD	DV	-			X	X	X		X
		Mugil incilis Hancock, 1830	LC	DV	MM			X	X	X		
		Mugil liza Valenciennes, 1836	NT	DV	MM	X	X	X	X			X
		Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007	DD	-	MM	X		X				X
Blenniiformes	Dactyloscopidae	*Dactyloscopus crossotus* Starks, 1913	LC	-	MS				X			
Atheriniformes	Atherinopsidae	*Atherinella brasiliensis* (Quoy & Gaimard, 1825)	LC	OV	ES	X	X	X	X	X		
		Atherinella cf. blackburni (Schultz, 1949)	LC	ZP	MM				X			
Beloniformes	Hemiramphidae	*Hemiramphus brasiliensis* (Linnaeus, 1758)	LC	HV	MS	X		X		X		
		Hyporhamphus roberti roberti (Valenciennes, 1847)	LC	HV/OP	MM		X	X				
		Hyporhamphus unifasciatus (Ranzani, 1841)	NT	OP	MM	X	X	X	X	X		X
	Belonidae	*Ablennes hians* (Valenciennes, 1846)	LC	PV	MS				X			
		Strongylura marina (Walbaum, 1792)	LC	PV	MM				X	X		
		Strongylura timucu (Walbaum, 1792)	LC	PV	MM	X	X	X	X	X		X
		Tylosurus acus acus (Lacepède, 1803)	LC	PV	MS	X			X			
		Tylosurus crocodilus crocodilus (Péron & Lesueur, 1821)	LC	PV	MM				X			

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Cyprinodontiformes	Poeciliidae	*Poecilia vivipara* (Bloch & Schneider, 1801)	LC	ZP	FS		X					
Carangiformes	Echeneidae	*Echeneis naucrates* Linnaeus, 1758	LC	DV	MS							X
	Carangidae	*Carangoides bartholomaei* (Cuvier, 1833)	LC	PV	MS				X	X	X	X
		Caranx crysos (Mitchill, 1815)	LC	PV	MS	X	X				X	X
		Caranx hippos (Linnaeus, 1766)	LC	PV	MS	X	X			X	X	X
		Caranx latus Agassiz, 1831	LC	ZB	MS	X	X		X	X	X	X
		Chloroscombrus chrysurus (Linnaeus, 1766)	LC	ZB	MS	X					X	
		Oligoplites palometa (Cuvier, 1832)	LC	PV	MM	X	X				X	X
		Oligoplites saliens (Bloch, 1793)	LC	PV	MM	X					X	X
		Oligoplites saurus (Bloch & Schneider, 1801)	LC	PV	MM	X	X		X	X	X	X
		Selene brownii (Cuvier, 1816)	LC	ZB	MS							X
		Selene vomer (Linnaeus, 1758)	LC	PV	MS	X	X				X	X
		Trachinotus carolinus (Linnaeus, 1766)	LC	ZB	MM							X
		Trachinotus falcatus (Linnaeus, 1758)	LC	ZB	MS						X	X
Istiophoriformes	Sphyraenidae	*Sphyraena barracuda* (Edwards, 1771)	LC	PV	MM	X	X		X	X	X	X
		Sphyraena guachancho Cuvier, 1829	LC	PV	MS	X				X		X
Pleuronectiformes	Paralichthyidae	*Citharichthys arenaceus* Evermann & Marsh, 1900	LC	ZB	ES		X		X	X		X
		Citharichthys macrops Dresel, 1885	LC	ZP	MS					X		
		Citharichthys spilopterus Günther, 1862	LC	ZB	ES	X			X	X	X	
		Etropus crossotus Jordan & Gilbert, 1882	LC	ZB	MM	X			X	X		
		Etropus longimanus Norman, 1933	LC	ZB	MS	X						
		Paralichthys brasiliensis (Ranzani, 1842)	LC	ZB	MM	X	X		X	X		X
		Syacium micrurum Ranzani, 1842	LC	ZB	MM				X			
	Bothidae	*Bothus ocellatus* (Agassiz, 1831)	LC	ZB	MM				X	X		X
		Bothus robinsi Topp & Hoff, 1972	LC	ZB	MS					X		
	Achiriidae	*Achirus achirus* (Linnaeus, 1758)	LC	ZB	ES	X					X	X
		Achirus declivis Chabanaud, 1940	LC	ZB	ES	X				X	X	
		Achirus lineatus (Linnaeus, 1758)	LC	ZB	ES	X	X		X	X	X	X
		Achirus mucuri Ramos, Ramos & Lopes, 2009	VU	-	-						X	
		Trinectes microphthalmus Chabanaud, 1928	LC	ZB	MM						X	
		Trinectes paulistanus (Miranda Ribeiro, 1915)	LC	ZB	MM	X				X	X	
	Cynoglossidae	*Symphurus diomedeanus* (Goode & Bean, 1885)	LC	ZB	MM				X			
		Symphurus plagusia (Bloch & Schneider, 1801)	LC	ZB	ES		X			X		
		Symphurus tessellatus (Quoy & Gaimard, 1824)	LC	ZB	ES	X			X	X	X	X
Syngnathiformes	Syngnathidae	*Bryx dunckeri* (Metzelaar, 1919)	LC	ZP	ES					X		
		Cosmocampus elucens (Poey, 1868)	LC	ZB	MS		X		X			
		Hippocampus erectus Perry, 1810	VU	ZB	MS	X			X	X		
		Hippocampus reidi Ginsburg, 1933	VU	ZP	MM					X		X

		Microphis brachyurus lineatus (Kaup, 1856)	NE	ZP	ES		X					

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Syngnathiformes	Syngnathidae	*Syngnathus pelagicus* Linnaeus, 1758	LC	ZB	MS		X	X	X			
	Fistulariidae	*Fistularia petimba* Lacepède, 1803	LC	PV	ES		X	X				
		Fistularia tabacaria Linnaeus, 1758	LC	PV	MS		X	X				
	Dactylopteridae	*Dactylopterus volitans* Linnaeus, 1758	LC	ZB	MS		X		X	X		
Scombriformes	Trichiuridae	*Trichiurus lepturus* Linnaeus, 1758	LC	PV	MS					X	X	
	Scombridae	*Scomberomorus brasiliensis* Collete, Russo & Zavala-Camin, 1978	LC	PV	MS		X				X	
		Scomberomorus regalis (Bloch, 1793)	LC	PV	MS						X	
	Stromateidae	*Peprilus paru* (Linnaeus, 1758)	LC	OV	MS	X						
Trachiniformes	Uranoscopidae	*Astroscopus y-graecum* Cuvier, 1829	LC	PV	MS				X			
Labriformes	Scaridae	*Sparisoma amplum* (Ranzani, 1842)	NT	HV	MS		X					
		Sparisoma axillare (Steindachner, 1878)	VU	HV	MS			X			X	
		Sparisoma radians (Valenciennes, 1840)	LC	HV	MS	X			X		X	
Perciformes	Centropomidae	*Centropomus ensiferus* Poey, 1860	LC	PV	-					X		
		Centropomus mexicanus Bocourt, 1868	LC	PV	-			X		X	X	
		Centropomus parallelus (Poey, 1860)	LC	PV	MM	X	X	X	X	X	X	
		Centropomus pectinatus Poey, 1860	LC	PV	MM	X		X	X	X	X	
		Centropomus undecimalis (Bloch, 1792)	LC	PV	MM	X	X	X	X	X	X	
	Gerreidae	*Diapterus auratus* Ranzani, 1842	LC	ZB	MM	X	X	X	X	X	X	
		Diapterus rhombeus (Cuvier, 1829)	LC	ZP	MM	X	X	X	X	X	X	
		Eucinostomus argenteus Baird & Girard, 1855	LC	ZB	MM	X	X	X	X	X	X	
		Eucinostomus gula (Quoy & Gaimard, 1824)	LC	ZB	MM	X	X	X	X	X		
		Eucinostomus havana (Nichols, 1912)	LC	ZB	MM	X		X	X			
		Eucinostomus melanopterus (Bleeker, 1863)	LC	ZB	MM	X	X	X	X	X	X	
		Eugerres brasilianus (Cuvier, 1830)	LC	OV	MM	X	X	X	X	X	X	
		Gerres cinereus (Walbaum, 1792)	LC	ZB	MM	X				X	X	
		Ulaema lefroyi (Goode, 1874)	LC	ZB	ES		X	X	X			
	Mullidae	*Pseudupeneus maculatus* (Bloch, 1793)	LC	ZB	MS				X			
	Serranidae	*Alphestes afer* (Bloch, 1793)	DD	ZB	MS						X	
		Epinephelus adscencionis (Osbeck, 1765)	DD	ZB	MS	X		X	X		X	
		Epinephelus itajara (Lichtenstein, 1822)	CR	PV/OP	MS						X	
		Mycteroperca bonaci (Poey, 1860)	VU	PV	MS	X						
		Rypticus randalli Courtenay, 1967	LC	PV	MS	X				X	X	
		Rypticus saponaceus (Bloch & Schneider, 1801)	LC	ZB	MS			X	X		X	
		Serranus flaviventris (Cuvier, 1829)	LC	OP	MS			X				
	Chaetodontidae	*Chaetodon ocellatus* (Bloch, 1787)	DD	ZB	MS	X						
		Chaetodon striatus Linnaeus, 1758	LC	ZP	MS			X				
	Pomacanthidae	*Pomacanthus arcuatus* (Linnaeus, 1758)	DD	ZB	MS						X	
		Pomacanthus paru (Bloch, 1787)	DD	ZB	MS				X			

	Haemulidae	*Conodon nobilis* (Linnaeus, 1758)	LC	ZB	MM						X	

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Perciformes	Haemulidae	*Genyatremus luteus* (Bloch, 1790)	LC	OP	MS	X					X	
		Haemulon aurolineatum Cuvier, 1830	LC	ZB	MS			X	X			
		Haemulon parra (Desmarest, 1823)	LC	ZB	MS	X		X				X
		Haemulon steindachneri (Jordan & Gilbert, 1882)	LC	ZB	MS		X		X			
		Haemulopsis corvinaeformis (Steindachner, 1868)	LC	ZB	MS		X		X	X	X	
		Pomadasys crocro (Cuvier, 1830)	LC	ZB	MS	X	X		X	X	X	
		Pomadasys ramosus Poey, 1860	LC	ZB	MM		X					
	Lutjanidae	*Lutjanus alexandrei* Moura & Lindeman, 2007	LC	ZB	MS	X	X	X	X	X	X	
		Lutjanus analis (Cuvier, 1828)	NT	ZB	MS	X		X			X	
		Lutjanus cyanopterus (Cuvier, 1828)	VU	ZB	MS		X		X	X	X	
		Lutjanus jocu (Bloch & Schneider, 1801)	NT	ZB	MS	X	X	X	X	X	X	
		Lutjanus synagris (Linnaeus, 1758)	NT	ZB	MS	X	X	X			X	
		Ocyurus chrysurus (Bloch, 1791)	NT	ZB	MS						X	
	Polynemidae	*Polydactylus virginicus* (Linnaeus, 1758)	LC	ZB	MM	X			X	X	X	
Scorpaeniformes	Scorpaenidae	*Scorpaena plumieri* Bloch, 1789	LC	ZB	MS			X			X	
	Triglidae	*Prionotus punctatus* (Bloch, 1793)	LC	ZB	MS	X	X	X			X	
Moroniformes	Ephippidae	*Chaetodipterus faber* (Broussonet, 1782)	LC	OV	MM	X	X	X	X	X	X	
Acanthuriformes	Sciaenidae	*Bairdiella ronchus* (Cuvier, 1830)	LC	ZB	MM	X	X	X	X	X	X	
		Cynoscion acoupa (Lacepède, 1801)	NT	PV	MM					X		
		Cynoscion leiarchus (Cuvier, 1830)	LC	ZB	MM	X					X	
		Cynoscion virescens (Cuvier, 1830)	LC	-	MM	X						
		Isopisthus parvipinnis (Cuvier, 1830)	LC	PV	MM	X				X	X	
		Macrodon ancylodon (Bloch & Schneider, 1801)	LC	PV	MM	X						
		Menticirrhus americanus (Linnaeus, 1758)	DD	ZB	MM	X	X			X	X	
		Micropogonias furnieri (Desmarest, 1823)	LC	ZB	MM	X				X	X	
		Ophioscion punctatissimus Meek & Hildebrand, 1925	DD	ZB	MM					X		
		Stellifer brasiliensis (Schultz, 1945)	LC	ZB	MM						X	
		Stellifer microps (Steindachner, 1864)	LC	ZB	ES	X				X		
		Stellifer rastrifer (Jordan, 1889)	LC	ZB	MM					X		
		Stellifer stellifer (Bloch, 1790)	LC	ZB	ES	X						
	Acanthuridae	*Acanthurus bahianus* Castelnau, 1855	LC	HV	MS				X			
		Acanthurus chirurgus (Bloch, 1787)	LC	HV	MS	X		X				
Spariformes	Sparidae	*Archosargus probatocephalus* (Walbaum, 1792)	DD	OV	MS	X						X
		Archosargus rhomboidalis Linnaeus, 1758	LC	ZB	MS	X	X	X	X	X	X	
	Lobotidae	*Lobotes surinamensis* (Bloch, 1790)	LC	PV	MS	X						
Lophiiformes	Antennariidae	*Antennarius striatus* (Shaw, 1794)	DD	ZB	MS				X			
	Ogcocephalidae	*Ogcocephalus vespertilio* (Linnaeus, 1758)	LC	ZB	MS							X

Table III: List of fish species recorded in six estuaries in north-eastern Brazil, along with their conservation status (IUCN list) and respective feeding mode (FMFG) and estuarine use (EUFG) functional groups (Elliot et al., 2007). Estuaries: Santa Cruz channel (STC), Jaguaribe (JAG), Suape (SUA), Maracaípe (MAR), Sirinhaém (SIR) and Rio Formoso (RIO). IUCN classification: NE - not evaluated; DD - data deficient; LC - least concern; VU - vulnerable; NT - near threatened; CR - critically endangered; feeding mode functional groups (FMFG): ZB - zoobenthivore; PV - piscivore; ZP - zooplanktivore; HV - herbivore; OV - omnivore; DV - detritivore; OP - opportunistic, estuarine use functional group (EUFG): MM - marine migrants; MS - marine straggler; ES - estuarine species; FS - freshwater species.

Tetraodontiformes	Balistidae	*Balistes vetula* Linnaeus, 1758	NT	ZB	MS				X		
	Tetraodontidae	*Colomesus psittacus* (Bloch & Schneider, 1801)	LC	ZB	ES	X					
		Lagocephalus laevigatus (Linnaeus, 1766)	LC	HV	MM	X	X			X	X
		Sphoeroides greeleyi Gilbert, 1900	LC	ZB	ES	X	X	X	X	X	
		Sphoeroides spengleri (Bloch, 1785)	LC	ZB	ES			X	X		
		Sphoeroides testudineus (Linnaeus, 1758)	DD	ZB	ES	X	X	X	X	X	X
	Diodontidae	*Chilomycterus antillarum* Jordan & Rutter, 1897	LC	-	MS			X			
		Chilomycterus spinosus spinosus (Linnaeus, 1758)	LC	ZB	MS	X	X				

† Categories based on the regional IUCN red list of threatened species (ICMBio, 2018).

‡ References used for FMFG and EUFG classification are shown in the Supplementary Material Table I.

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Supplementary Material

Table I: Classification of feeding mode functional group (FMFG): ZB - zoobenthivore; PV - piscivore; ZP - zooplanktivore; HV - herbivore; OV - omnivore; DV - detritivore; OP - opportunistic and estuarine use functional group (EUFG): MM - marine migrants; MS - marine straggler; ES - estuarine species; FS - freshwater species, for the species observed during the study and references used for each category.

Species	FMFG	Reference FMFG	EUFG	Reference EUFG
Ablennes hians (Valenciennes, 1846)	PV	(Collette 1995)	MS	(Sasekumar et al. 1992); (Collette 2003)
Acanthurus bahianus Castelnau, 1855	HV	(Pimentel 2012)	MS	(Vasconcelos Filho, Oliveira 1999)
Acanthurus chirurgus (Bloch, 1787)	HV	(Longo et al. 2015)	MS	(Vasconcelos Filho, Oliveira 1999)
Achirus achirus (Linnaeus, 1758)	ZB	(Mourão et al. 2014)	ES	(Vasconcelos Filho, Oliveira 1999)
Achirus declives Chabanaud, 1940	ZB	(Duarte, Andreata 2001)	ES	(Vasconcelos Filho, Oliveira 1999)
Achirus lineatus (Linnaeus, 1758)	ZB	(Vasconcelos Filho et al. 2003)	ES	(Vasconcelos Filho, Oliveira 1999)
Achirus mucuri Ramos, Ramos & Lopes, 2009	-	-	-	-
Ahlia egmontis (Jordan, 1884)	ZB	(Pimentel et al. 2018)	MS	(Ross, Rohde 2003)
Albula vulpes (Linnaeus, 1758)	ZB	(Crabtree et al. 1998)	MM	(Paiva et al. 2009)
Alphestes afer (Bloch, 1793)	ZB	(Randall 1967)	MS	(Medeiros et al. 2009; Marques, Ferreira 2011)
Anchoa filifera (Fowler, 1915)	ZB	(Muto et al. 2014)	ES	(Passos et al. 2013)
Anchoa januaria (Steindachner, 1879)	ZP	(Araújo et al. 2016)	ES	(Passos et al. 2013)
Anchoa lyolepis (Evermann & Marsh, 1902)	ZP	(Froese, Pauly, 2018)	MS	(Lieske, Myers 1994)
Anchoa marinii Hildebrand, 1943	ZP	(Whitehead,1985)	MS	(Riede, 2004)
Anchoa spinifer (Valenciennes, 1848)	PV	(Nizinski, Munroe, 2002)	MM	(Vasconcelos Filho, Oliveira 1999)
Anchoa tricolor (Spix & Agassiz, 1829)	ZB	(Araújo et al. 2008)	MM	(Araújo et al. 2008)
Anchovia clupeoides (Swainson, 1839)	ZP	(Paiva et al. 2008)	MM	(Vasconcelos Filho, Oliveira, 1999)
Anchoviella lepidentostole (Fowler, 1911)	ZB	(Planquette et al. 1996)	MM	(Paiva Filho et al. 1986)
Antennarius striatus (Shaw & Nodder, 1794)	ZB	(Nakane et al. 2011)	MS	(Paiva et al. 2009)
Archosargus probatocephalus (Walbaum, 1792)	OV	(Castillo-Rivera et al. 2007)	MS	(Castilho Rivera et al., 2007)
Archosargus rhomboidalis Linnaeus, 1758	ZB	(Yáñez-Arancibia 1986)	MS	(Vasconcelos Filho, Oliveira, 1999)
Ariosoma balearicum (Delaroche, 1809)	-	-	MS	(Miller, 2002; Ross et al. 2007)
Aspistor luniscutis (Valenciennes, 1840)	OV	(Denadai et al. 2012)	MS	(Denadai et al., 2012)
Aspistor quadriscutis (Valenciennes, 1840)	ZB	(Denadai et al., 2012)	MS	(Denadai et al., 2012)
Astroscopus ygraecum Cuvier, 1829	PV	(Cervigón, 1993)	MS	(Grimes et al. 1982; Peterson et al. 2000; Cézar Felix et al. 2006)
Atherinella brasiliensis (Quoy & Gaimard, 1824)	OV	(Paiva et al. 2008)	ES	(Vasconcelos Filho, Oliveira, 1999)
Atherinella cf. blackburni (Schultz, 1949)	ZP	(Gonzalez, Vaske Júnior, 2017)	MM	(Mattox et al. 2008; Correa-Herrera et al. 2017)
Bairdiella ronchus (Cuvier, 1830)	ZB	(Ferreira et al. 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)

Balistes vetula Linnaeus, 1758	ZB	(Menezes, 1979)	MS	(Schärer et al. 2010; Rivera Hernández et al. 2019)
Bathygobius soporator (Valenciennes, 1837)	PV	(Corrêa et al. 2005)	ES	(Paiva et al. 2009)
Batrachoides surinamensis (Bloch & Schmeider, 1801)	ZB	(Collette, 2010)	MS	(Uyeno et al. 1983)
Bothus ocellatus (Agassiz, 1831)	ZB	(Maurakis et al. 2010)	MM	(Vasconcelos Filho, Oliveira, 1999)
Bothus robinsi Topp & Hoff, 1972	ZB	(Figueiredo, Menezes, 2000)	MS	(Mendonça, Araújo, 2002; Marancik et al. 2005)
Bryx dunckeri (Metzelaar, 1919)	ZP	(Passos et al. 2013)	ES	(Passos et al. 2013)
Carangoides bartholomaei (Cuvier, 1833)	PV	(Paiva et al. 2008)	MS	(Santos, 2012)
Caranx crysos (Mitchill, 1815)	PV	(Sley et al. 2009)	MS	(Barletta, Blaber, 2007)
Caranx hippos (Linnaeus, 1766)	PV	(Temóteo et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Caranx latus (Agassiz, 1831)	ZB	(Temóteo et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Cathorops agassizii (Eigenmann & Eigenmann, 1888)	ZB	-	ES	(Dantas et al. 2012)
Cathorops spixii (Agassiz, 1829)	ZB	(Medeiros et al. 2010)	ES	(Vasconcelos Filho, Oliveira, 1999)
Centropomus ensiferus Poey, 1860	PV	(Rueda and Defeo 2003)	-	-
Centropomus mexicanus Bocourt 1868	PV	(Ferreira et al. 2019)	-	-
Centropomus parallelus (Poey, 1860)	PV	(Lira et al. 2017)	MM	(Vasconcelos Filho, Oliveira, 1999)
Centropomus pectinatus Poey, 1860	PV	(Lira, 2017)	MM	(Jackson, Ockelmann-Lobello, 2006)
Centropomus undecimalis (Bloch,1792)	PV	(Lira et al. 2017)	MM	(Vasconcelos Filho, Oliveira, 1999)
Cetengraulis edentulus (Cuvier, 1829)	ZP	(Paiva et al. 2008)	MM	(Vasconcelos Filho, Oliveira, 2000)
Chaetodipterus faber (Broussonet, 1782)	OV	(Vasconcelos Filho et al. 2009)	MM	(Riede, 2004)
Chaetodon ocellatus (Bloch, 1787)	ZB	(Carpenter, 2003b)	MS	(Rocha, 2010)
Chaetodon striatus (Linnaeus, 1758)	ZP	(Liedke et al. 2016)	MS	(Vasconcelos Filho, Oliveira, 1999)
Chilomycterus antillarum Jordan & Rutter, 1897	-	-	MS	(Paiva et al. 2009)
Chilomycterus spinosus spinosus (Linnaeus, 1758)	ZB	(Almeida-Silva et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Chirocentrodon bleekerianus (Poey 1867)	ZB	(Muto et al. 2014)	MS	(Passos et al. 2013)
Chloroscombrus chrysurus (Linnaeus, 1766)	ZB	(Silva, Lopes, 2002)	MS	(Vasconcelos Filho, Oliveira, 1999)
Citharichthys arenaceus Evermann & Marsh, 1900	ZB	(Araújo et al. 2016)	ES	(Paiva et al. 2009)
Citharichthys macrops Dresel, 1885	ZP	(Castillo-Rivera et al. 2000)	MS	(Passos et al. 2013)
Citharichthys spilopterus (Günther, 1880)	ZB	(Vasconcelos Filho et al. 2010)	ES	(Paiva et al. 2009)
Colomesus asellus (Müller & Troschel, 1848)	IN	(Bartolette et al. 2018)	FS	-
Colomesus psittacus (Bloch & Schneider, 1801)	ZB	(Lobato et al. 2018)	ES	(Barletta-Bergan et al. 2002; Zacardi et al. 2016)
Conodon nobilis Linnaeus, 1758	ZB	(Lopes et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Cosmocampus elucens (Poey, 1868)	ZB	(Carpenter 2003b)	MS	(Passos et al. 2013)
Ctenogobius boleosoma (Jordan & Gilbert, 1882)	DV	(Vasconcelos Filho et al. 2009)	ES	(Vasconcelos Filho, Oliveira, 1999)

Ctenogobius saepepallens (Gilbert & Randall, 1968)	ZB	(Randall, 2004)	MS	(Baldwin, Smith, 2003; Ross, Rhode, 2004)
Ctenogobius shufeldti (Jordan & Eigenmann, 1887)	OV	(Contente et al. 2012)	ES	(Wyanski, Targett, 2000)
Ctenogobius smaragdus (Valenciennes, 1837)	DV	(Passos et al. 2013)	ES	(Vasconcelos Filho, Oliveira, 1999)
Ctenogobius stigmaticus (Poey, 1860)	DV	(Passos et al. 2013)	ES	(Vasconcelos Filho, Oliveira, 1999)
Cynoscion acoupa (Lacepède, 1800)	PV	(Ferreira et al. 2016)	MM	(Passos et al. 2013)
Cynoscion leiarchus (Cuvier, 1830)	ZB	(Araújo et al. 2016)	MM	(Chao, 1978)
Cynoscion virescens (Cuvier, 1830)	-	-	MM	(Paiva et al. 2009)
Dactylopterus volitans Linnaeus, 1758	ZB	(Guedes et al. 2015)	MS	(Paiva et al. 2009)
Dactyloscopus crossotus Starks, 1913	-	-	MS	(Herrema et al. 1985)
Diapterus auratus (Ranzani, 1840)	ZB	(Temóteo et al. 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)
Diapterus rhombeus (Cuvier, 1829)	ZP	(Temóteo et al. 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)
Echeneis neucrates Linnaeus, 1758	DV	(Williams et al. 2003)	MS	(Vasconcelos Filho, Oliveira, 1999)
Eleotris pisonis (Gmelin, 1789)	PV	(Gonçalves et al. 2018)	ES	(Nordlie, 1981; Winemiller, Ponwith, 1998)
Elops saurus Linnaeus, 1758	PV	(Robins, Ray, 1986)	MS	(Vasconcelos Filho, Oliveira, 1999)
Engraulis anchoita Hubbs & Marini 1935	ZP	(Vasconcellos et al. 1998)	MS	(Riede, 2004)
Epinephelus adscencionis (Osbeck, 1765)	ZB	(Medeiros et al. 2010)	MS	(Pereira et al. 2015)
Epinephelus itajara (Lichtenstein, 1822)	PV/OP	(Freitas et al. 2015)	MS	(Paiva et al. 2009)
Erotelis smaragdus (Valenciennes, 1837)	-	-	ES	(Vasconcelos Filho, Oliveira, 1999)
Etropus crossotus Jordan & Gilbert, 1882	ZB	(Paiva et al. 2008)	MM	(Oliveira, Favaro, 2011)
Etropus longimanus Norman, 1933	ZB	(Figueiredo, Menezes, 2000a)	MS	(Saad, Fagundes Netto, 1992; Derisio et al. 2012)
Eucinostomus argenteus (Baird & Girard, l854)	ZB	(Leão, 2016)	MM	(Vasconcelos Filho, Oliveira, 1999)
Eucinostomus gula (Quoy & Gaimard, 1824)	ZB	(Zahorcsak et al. 2000a)	MM	(Vasconcelos Filho, Oliveira, 1999)
Eucinostomus havana (Nichols, 1912)	ZB	(Froese, Pauly, 2018)	MM	(Passos et al. 2013)
Eucinostomus melanopterus (Bleeker, 1863)	ZB	(Ramos et al. 2011)	MM	(Chaves, Bouchereau 2000)
Eugerres brasilianus (Cuvier, 1830)	OV	(Vasconcelos Filho et al. 2009)	MM	(Vasconcelos Filho, Oliveira, 1999)
Evorthodus lyricus (Girard, 1858)	DV	(STRI, 2017)	MS	(Vasconcelos Filho and Oliveira 1999)
Fistularia petimba Lacepède, 1803	PV	(Kalogirou et al. 2007); (Paiva et al. 2009)	ES	(Passos et al. 2013)
Fistularia tabacaria Linnaeus, 1758	PV	(Fritzsche, 1990)	MS	(Vasconcelos Filho, Oliveira, 1999)
Genyatremus luteus Bloch, 1795	OP	(Almeida et al. 2005)	MS	(Vasconcelos Filho, Oliveira, 1999)
Gerres cinereus (Walbaum, 1792)	ZB	(Randall, Vergara 1978)	MM	(Halpern, 2004)
Gobioides broussonnetii Lacepède, 1800	DV	(Mata-Cortes et al. 2004)	ES	(Mourão et al. 2014)
Gobionellus oceanicus (Pallas, 1770)	DV	(Vasconcelos Filho et al. 2009)	ES	(Vasconcelos Filho, Oliveira, 1999)
Gobionellus stomatus Starks, 1913	DV	(Passos et al. 2013)	ES	(Vasconcelos Filho, Oliveira, 1999)
Guavina guavina (Valenciennes in Cuvier & Valenciennes, 1837)	ZB	(Teixeira, 1994)	ES	(Vasconcelos Filho, Oliveira, 1999)

Gymnothorax funebris Ranzani, 1839	ZB	(Carvalho-Filho, 1999)	MS	(Vasconcelos Filho, Oliveira, 1999)
Gymnothorax ocellatus Agassiz, 1831	ZB	(Santos, Castro, 2003)	MS	(Lieske, Myers, 1994)
Haemulon aurolineatum Cuvier, 1830	ZB	(Pereira et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Haemulon parra Desmarest, 1823	ZB	(Paiva et al. 2008)	MS	(Vasconcelos Filho, Oliveira, 1999)
Haemulon steindachneri Jordan & Gilbert, 1882	ZB	(Pereira et al. 2015)	MS	(Daros, 2014)
Haemulopsis corvinaeformis Steindachner, 1868	ZB	(Denadai et al. 2013)	MS	(Paiva et al. 2009)
Harengula clupeola (Cuvier, 1829)	ZP	(Paiva et al. 2008)	MS	(Vasconcelos Filho, Oliveira, 1999)
Harengula humeralis (Cuvier, 1829)	ZP	(Ortaz et al. 1996)	MM	(Bouchereau et al. 2008)
Hemiramphus brasiliensis (Linnaeus, 1758)	HV	(Schwamborn 2004)	MS	(Vasconcelos Filho, Oliveira, 1999)
Hippocampus erectus Perry, 1810	ZB	(Teixeira, Musick, 2001)	MS	(Vasconcelos Filho, Oliveira, 1999)
Hippocampus reidi Ginsburg, 1933	ZP	(Castro et al. 2008)	MM	(Vasconcelos Filho, Oliveira, 1999)
Holocentrus adscensiones (Osbeck, 1765)	ZB	(Fischer et al. 1981)	MS	(Silva Júnior et al. 2015)
Hypanus americanus (Hildebrand & Schroeder, 1928)	ZB	(Stehmann et al. 1978)	MM	(Fuentes et al. 2019)
Hypanus guttatus (Bloch & Schneider, 1801)	ZB	(Anderson et al. 2015)	MS	(Uyeno et al. 1983)
Hyporhamphus roberti (Valenciennes, 1847)	HV/OP	(Medeiros et al. 2017)	MM	(Díaz-Ruiz, 2003)
Hyporhamphus unifasciatus (Ranzani, 1841)	OV	(Ferreira, 2018)	MM	(Vasconcelos Filho, Oliveira, 1999)
Isopisthus parvipinnis (Cuvier, 1830)	PV	(Lira et al. 2017)	MM	(Silva Júnior et al. 2015)
Lagocephalus laevigatus (Linnaeus, 1766)	HV	(Denadai et al. 2012)	MM	(Andrade et al. 2015)
Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)	HV	(Sales, 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)
Lobotes surinamensis (Bloch, 1790)	PV	(Franks et al. 2003)	MS	(Vasconcelos Filho, Oliveira, 1999)
Lutjanus alexandrei Moura & Lindeman, 2007	ZB	(Moraes, 2012)	MS	(Fernandes et al. 2012)
Lutjanus analis (Cuvier, 1828)	ZB	(Freitas et al. 2011)	MS	(Vasconcelos Filho, Oliveira, 1999)
Lutjanus cyanopterus (Cuvier, 1828)	ZB	(Allen, 1985)	MS	(Bastos et al. 2013)
Lutjanus jocu (Bloch & Schneider, 1801)	ZB	(Monteiro et al. 2009)	MS	(Vasconcelos Filho, Oliveira, 1999)
Lutjanus synagris (Linnaeus, 1758)	ZB	(Freitas et al. 2011)	MS	(Vasconcelos-Filho, Oliveira, 2000)
Lycengraulis grossidens (Spix & Agassiz, 1829)	PV	(Bortoluzzi et al. 2006)	ES	(Mai, Vieira, 2013)
Macrodon ancylodon (Bloch & Schneider, 1801)	PV	(Figueiredo et al. 2014)	MM	(Militelli, Macchi, 2004)
Megalops atlanticus Valenciennes, 1847	PV	(Cataño, 1994)	MM	(Rickards, 1968)
Menticirrhus americanus (Linnaeus, 1758)	ZB	(Rondineli et al. 2007)	MM	(Turra et al. 2012)
Microgobius meeki Evermann & Marsh, 1900	ZB	(Froese, Pauly, 2018)	MS	(WoRMS, 2020)
Microphis lineatus (Kaup, 1856)	ZP	(Teixeira, Perrone, 1998)	ES	(Miranda-Marure et al. 2004)
Micropogonias furnieri (Desmarest, 1823)	ZB	(Mendoza-Carranza, Vieira 2008)	MM	(Paiva et al. 2009)
Mugil brevirostris (Ribeiro, 1915)	-	-	MM	(Dantas et al. 2015)
Mugil curema Valenciennes, 1836	DV	(Passos et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Mugil curvidens Valenciennes, 1836	DV	(Passos et al. 2013)	-	-
Mugil incilis Hancock, 1830	DV	(Passos et al. 2013)	MM	(Dantas et al. 2015)

Mugil liza Valenciennes, 1836	DV	(Cervigón, 1993)	MM	(Vasconcelos Filho, Oliveira, 1999)
Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007	-	-	MM	(Dantas et al. 2015)
Mycteroperca bonaci (Poey, 1860)	PV	(Daros, 2014)	MS	(Daros, 2014)
Myrichthys ocellatus (Lesueur, 1825)	ZB	(Luiz et al. 2008)	MS	(Monteiro-Neto et al. 2013)
Myrophis punctatus Lütken, 1852	ZB	(Vaslet et al. 2011)	MM	(Barletta et al. 2000)
Notarius grandicassis (Valenciennes, 1840)	ZB	(Mendes, Barthem, 2010)	MM	(Marceniuk et al. 2017)
Ocyurus chrysurus (Bloch, 1791)	ZB	(Heck, Weinstein, 1989)	MS	(Vasconcelos Filho, Oliveira, 1999)
Ogcocephalus vespertilio (Linnaeus, 1758)	ZB	(Gibran, Castro, 1999)	MS	(Vasconcelos Filho, Oliveira, 1999)
Oligoplites palometa (Curvier, 1833)	PV	(Vasconcelos Filho et al. 2010)	MM	(Vasconcelos Filho, Oliveira, 1999)
Oligoplites saliens (Bloch, 1793)	PV	(Winik et al. 2007)	MM	(Vasconcelos Filho, Oliveira, 1999)
Oligoplites saurus (Bloch & Schneider, 1801)	PV	(Medeiros et al. 2017)	MM	(Vasconcelos Filho, Oliveira, 1999)
Ophichthus cylindroideus (Ranzani, 1839)	PV	(Giarrizzo, Krumme, 2007)	ES	(Giarrizzo, Krumme, 2007)
Ophichthys ophis (Linnaeus, 1758)	PV	(Randall, 1967)	MS	(Schneider, 1990)
Ophioscion punctatissimus Meek & Hildebrand, 1925	ZB	(Zahorcsak et al. 2000)	MM	(Spach et al. 2004)
Opisthonema oglinum (Lesueur, 1818)	ZP	(Vasconcelos-Filho, 1979)	MS	(Vasconcelos Filho, Oliveira, 1999)
Paralichthys brasiliensis (Ranzani, 1842)	ZB	(Froese, Pauly, 2018)	MM	(Vasconcelos Filho, Oliveira, 1999)
Peprilus paru Linnaeus, 1758	OV	(Passos et al. 2013)	MS	(Passos et al. 2013)
Phaeoptyx pigmentaria (Poey, 1860)	ZP	(Greenfield, Johnson, 1990)	MS	(Greenfield, Johnson, 1990)
Platanichthys platana (Regan, 1917)	ZP	(Aguiaro et al. 2003)	ES	(Aguiaro et al. 2003)
Poecilia vivipara (Bloch & Schneider, 1801)	ZP	(Passos et al. 2013)	FS	(Paiva et al. 2009)
Polydactylus virginicus (Linnaeus, 1758)	ZB	(Lopes et al. 1998)	MM	(Vasconcelos Filho, Oliveira, 1999)
Pomacanthus arcuatus (Linnaeus, 1758)	ZB	(Hourigan et al. 1989)	MS	(Gasparini et al. 2005)
Pomacanthus paru (Bloch, 1787)	ZB	(Hourigan et al. 1989)	MS	(Vasconcelos Filho, Oliveira, 1999)
Pomadasys croco (Cuvier, 1830)	ZB	(Froese, Pauly, 2018)	MS	(Riede, 2004)
Pomadasys ramosus Poey, 1860	ZB	(Silva et al. 2018)	MM	(Silva et al. 2018)
Prionotus punctatus (Bloch, 1793)	ZB	(Longo et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Pseudupeneus maculatus (Bloch, 1793)	ZB	(Dantas et al. 2012)	MS	(Vasconcelos Filho, Oliveira, 1999)
Rhinosardinia bahiensis (Steindachner, 1879)	ZP	(Clark, Pessanha, 2015)	ES	(Clark, Pessanha, 2015)
Rypticus randalli Courtenay, 1967	PV	(Medeiros et al. 2017)	MS	(Passos et al. 2013)
Rypticus saponaceus (Bloch & Schneider, 1801)	ZB	(Feitosa et al. 2012)	MS	(Bejarano et al. 2014)
Sciades herzbergii (Bloch, 1794)	ZB	(Medeiros et al. 2017)	ES	(Vasconcelos Filho, Oliveira, 1999)
Sciades parkeri (Trail, 1982)	ZB	(Vasconcelos Filho et al. 2003)	ES	(Betancur et al. 2008)
Sciades proops (Valenciennes, 1840)	ZB	(Guedes, Vasconcelos Filho, 1980)	ES	(Vasconcelos Filho, Oliveira, 1999)
Scomberomorus brasiliensis Collete, Russo & Zavala-Camin, 1978	PV	(Collette, Nauen, 1983)	MS	(Vasconcelos Filho, Oliveira, 1999)
Scomberomorus regalis (Bloch, 1793)	PV	(Collette, Nauen, 1983)	MS	(Riede, 2004)

Scorpaena plumieri Bloch, 1789	ZB	(Heck, Weinstein, 1989)	MS	(Edwards, 1990)
Selene brownii (Curvier, 1816)	ZB	(Bomfim, 2014)	MS	(WoRMS, 2020)
Selene vomer (Linnaeus, 1758)	PV	(Daros, 2014)	MS	(Vasconcelos Filho, Oliveira, 1999)
Serranus flaviventris (Cuvier, 1829)	OP	(Maia-Nogueira et al. 2009)	MS	(Lieske, Myers, 1994)
Sparisoma amplum (Ranzani, 1842)	HV	(Ferreira, Gonçalves, 2006)	MS	(Moura et al. 2001)
Sparisoma axillare (Steindachner, 1878)	HV	(Ferreira, Gonçalves, 2006)	MS	(Moura et al. 2001)
Sparisoma radians (Valenciennes, 1840)	HV	(Paiva et al. 2008)	MS	(Vasconcelos Filho, Oliveira, 1999)
Sphoeroides greeleyi Gilbert, 1900	ZB	(Figueiredo, Menezes, 2000)	ES	(Schultz et al. 2002)
Sphoeroides spengleri (Bloch, 1785)	ZB	(Targett, 1978)	ES	(Paiva et al. 2009)
Sphoeroides testudineus (Linnaeus, 1758)	ZB	(Vasconcelos Filho et al. 1998)	ES	(Vasconcelos Filho, Oliveira, 1999)
Sphyraena barracuda (Edwards, 1771)	PV	(Akadje et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Sphyraena guachancho Cuvier, 1829	PV	(Lopes et al. 2012)	MS	(Bonecker et al. 2014)
Stellifer brasiliensis (Schultz, 1945)	ZB	(Passos et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Stellifer microps (Steindachner, 1864)	ZB	(Giarrizzo, Krumme, 2007)	ES	(Barletta, Blaber, 2007)
Stellifer rastrifer (Jordan, 1889)	ZB	(Passos et al. 2013)	MM	(Passos et al. 2013)
Stellifer stellifer (Bloch, 1790)	ZB	(Pombo et al. 2013)	ES	(Dantas et al. 2012)
Strongylura marina (Walbaum, 1792)	PV	(Passos et al. 2013)	MM	(Passos et al. 2013)
Strongylura timucu (Walbaum,1792)	PV	(Passos et al. 2013)	MM	(Paiva et al. 2009)
Syacium micrurum Ranzani, 1842	ZB	(Soares, 1997)	MM	(Vasconcelos Filho, Oliveira, 1999)
Symphurus diomedeanus (Goode & Bean, 1885)	ZB	(Almeida, 2018)	MM	(Jaureguizar et al. 2003)
Symphurus plagusia (Bloch & Schneider, 1801)	ZB	(Vasconcelos Filho et al. 2003)	ES	(Paiva et al. 2009)
Symphurus tessellatus (Quoy & Gaimard, 1824)	ZB	(Guedes et al. 2004)	ES	(Paiva et al. 2009)
Syngnathus pelagicus Linnaeus, 1758	ZB	(Carpenter, 2003)	MS	(Passos et al. 2013)
Synodus foetens (Linnaeus, 1766)	PV	(Cruz-Escalona et al. 2005)	MS	(Vasconcelos Filho, Oliveira, 1999)
Thalassophryne nattereri Steindachner, 1876	ZB	(Collette, 1966)	MS	(Vasconcelos Filho, Oliveira, 1999)
Trachinotus carolinus (Linnaeus, 1766)	ZB	(Stefanoni, 2008)	MM	(Denadai et al. 2013)
Trachinotus falcatus (Linnaeus, 1758)	ZB	(Hofling et al. 1998)	MS	(Vasconcelos Filho, Oliveira, 1999)
Trichiurus lepturus Linnaeus, 1758	PV	(Vasconcelos Filho et al. 2010)	MS	(Vasconcelos Filho, Oliveira, 1999)
Trinectes microphthalmus Chabanaud, 1928	ZB	(Contente et al. 2009)	MM	(Vasconcelos Filho, Oliveira, 1999)
Trinectes paulistanus (Miranda Ribeiro, 1915)	ZB	(Reis-Filho et al. 2011)	MM	(Passos et al. 2013)
Tylosurus acus acus (Lacepède, 1803)	PV	(Contente et al. 2009)	MS	(WoRMS, 2020)
Tylosurus crocodilus (Péron & Lesueur, 1821)	PV	(Blaber, 1990)	MM	(Favero et al. 2019)
Ulaema lefroyi (Goode, 1874)	ZB	(Silva et al. 2016)	ES	(Passos et al. 2013)
Species	FMFG	Reference FMFG	EUFG	Reference EUFG
Ablennes hians (Valenciennes, 1846)	PV	(Collette 1995)	MS	(Sasekumar et al. 1992); (Collette 2003)

Acanthurus bahianus Castelnau, 1855	HV	(Pimentel 2012)	MS	(Vasconcelos Filho, Oliveira 1999)
Acanthurus chirurgus (Bloch, 1787)	HV	(Longo et al. 2015)	MS	(Vasconcelos Filho, Oliveira 1999)
Achirus achirus (Linnaeus, 1758)	ZB	(Mourão et al. 2014)	ES	(Vasconcelos Filho, Oliveira 1999)
Achirus declives Chabanaud, 1940	ZB	(Duarte, Andreata 2001)	ES	(Vasconcelos Filho, Oliveira 1999)
Achirus lineatus (Linnaeus, 1758)	ZB	(Vasconcelos Filho et al. 2003)	ES	(Vasconcelos Filho, Oliveira 1999)
Achirus mucuri Ramos, Ramos & Lopes, 2009	-	-	-	-
Ahlia egmontis (Jordan, 1884)	ZB	(Pimentel et al. 2018)	MS	(Ross, Rohde 2003)
Albula vulpes (Linnaeus, 1758)	ZB	(Crabtree et al. 1998)	MM	(Paiva et al. 2009)
Alphestes afer (Bloch, 1793)	ZB	(Randall 1967)	MS	(Medeiros et al. 2009; Marques, Ferreira 2011)
Anchoa filifera (Fowler, 1915)	ZB	(Muto et al. 2014)	ES	(Passos et al. 2013)
Anchoa januaria (Steindachner, 1879)	ZP	(Araújo et al. 2016)	ES	(Passos et al. 2013)
Anchoa lyolepis (Evermann & Marsh, 1902)	ZP	(Froese, Pauly, 2018)	MS	(Lieske, Myers 1994)
Anchoa marinii Hildebrand, 1943	ZP	(Whitehead,1985)	MS	(Riede, 2004)
Anchoa spinifer (Valenciennes, 1848)	PV	(Nizinski, Munroe, 2002)	MM	(Vasconcelos Filho, Oliveira 1999)
Anchoa tricolor (Spix & Agassiz, 1829)	ZB	(Araújo et al. 2008)	MM	(Araújo et al. 2008)
Anchovia clupeoides (Swainson, 1839)	ZP	(Paiva et al. 2008)	MM	(Vasconcelos Filho, Oliveira, 1999)
Anchoviella lepidentostole (Fowler, 1911)	ZB	(Planquette et al. 1996)	MM	(Paiva Filho et al. 1986)
Antennarius striatus (Shaw & Nodder, 1794)	ZB	(Nakane et al. 2011)	MS	(Paiva et al. 2009)
Archosargus probatocephalus (Walbaum, 1792)	OV	(Castillo-Rivera et al. 2007)	MS	(Castilho Rivera et al., 2007)
Archosargus rhomboidalis Linnaeus, 1758	ZB	(Yáñez-Arancibia 1986)	MS	(Vasconcelos Filho, Oliveira, 1999)
Ariosoma balearicum (Delaroche, 1809)	-	-	MS	(Miller, 2002; Ross et al. 2007)
Aspistor luniscutis (Valenciennes, 1840)	OV	(Denadai et al. 2012)	MS	(Denadai et al., 2012)
Aspistor quadriscutis (Valenciennes, 1840)	ZB	(Denadai et al., 2012)	MS	(Denadai et al., 2012)
Astroscopus ygraecum Cuvier, 1829	PV	(Cervigón, 1993)	MS	(Grimes et al. 1982; Peterson et al. 2000; Cézar Felix et al. 2006)
Atherinella brasiliensis (Quoy & Gaimard, 1824)	OV	(Paiva et al. 2008)	ES	(Vasconcelos Filho, Oliveira, 1999)
Atherinella cf. blackburni (Schultz, 1949)	ZP	(Gonzalez, Vaske Júnior, 2017)	MM	(Mattox et al. 2008; Correa-Herrera et al. 2017)
Bairdiella ronchus (Cuvier, 1830)	ZB	(Ferreira et al. 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)
Balistes vetula Linnaeus, 1758	ZB	(Menezes, 1979)	MS	(Schärer et al. 2010; Rivera Hernández et al. 2019)
Bathygobius soporator (Valenciennes, 1837)	PV	(Corrêa et al. 2005)	ES	(Paiva et al. 2009)
Batrachoides surinamensis (Bloch & Schmeider, 1801)	ZB	(Collette, 2010)	MS	(Uyeno et al. 1983)
Bothus ocellatus (Agassiz, 1831)	ZB	(Maurakis et al. 2010)	MM	(Vasconcelos Filho, Oliveira, 1999)
Bothus robinsi Topp & Hoff, 1972	ZB	(Figueiredo, Menezes, 2000)	MS	(Mendonça, Araújo, 2002; Marancik et al. 2005)
Bryx dunckeri (Metzelaar, 1919)	ZP	(Passos et al. 2013)	ES	(Passos et al. 2013)
Carangoides bartholomaei (Cuvier, 1833)	PV	(Paiva et al. 2008)	MS	(Santos, 2012)
Caranx crysos (Mitchill, 1815)	PV	(Sley et al. 2009)	MS	(Barletta, Blaber, 2007)
Caranx hippos (Linnaeus, 1766)	PV	(Temóteo et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)

Caranx latus (Agassiz, 1831)	ZB	(Temóteo et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Cathorops agassizii (Eigenmann & Eigenmann, 1888)	ZB	-	ES	(Dantas et al. 2012)
Cathorops spixii (Agassiz, 1829)	ZB	(Medeiros et al. 2010)	ES	(Vasconcelos Filho, Oliveira, 1999)
Centropomus ensiferus Poey, 1860	PV	(Rueda and Defeo 2003)	-	-
Centropomus mexicanus Bocourt 1868	PV	(Ferreira et al. 2019)	-	-
Centropomus parallelus (Poey, 1860)	PV	(Lira et al. 2017)	MM	(Vasconcelos Filho, Oliveira, 1999)
Centropomus pectinatus Poey, 1860	PV	(Lira, 2017)	MM	(Jackson, Ockelmann-Lobello, 2006)
Centropomus undecimalis (Bloch,1792)	PV	(Lira et al. 2017)	MM	(Vasconcelos Filho, Oliveira, 1999)
Cetengraulis edentulus (Cuvier, 1829)	ZP	(Paiva et al. 2008)	MM	(Vasconcelos Filho, Oliveira, 2000)
Chaetodipterus faber (Broussonet, 1782)	OV	(Vasconcelos Filho et al. 2009)	MM	(Riede, 2004)
Chaetodon ocellatus (Bloch, 1787)	ZB	(Carpenter, 2003b)	MS	(Rocha, 2010)
Chaetodon striatus (Linnaeus, 1758)	ZP	(Liedke et al. 2016)	MS	(Vasconcelos Filho, Oliveira, 1999)
Chilomycterus antillarum Jordan & Rutter, 1897	-	-	MS	(Paiva et al. 2009)
Chilomycterus spinosus spinosus (Linnaeus, 1758)	ZB	(Almeida-Silva et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Chirocentrodon bleekerianus (Poey 1867)	ZB	(Muto et al. 2014)	MS	(Passos et al. 2013)
Chloroscombrus chrysurus (Linnaeus, 1766)	ZB	(Silva, Lopes, 2002)	MS	(Vasconcelos Filho, Oliveira, 1999)
Citharichthys arenaceus Evermann & Marsh, 1900	ZB	(Araújo et al. 2016)	ES	(Paiva et al. 2009)
Citharichthys macrops Dresel, 1885	ZP	(Castillo-Rivera et al. 2000)	MS	(Passos et al. 2013)
Citharichthys spilopterus (Günther, 1880)	ZB	(Vasconcelos Filho et al. 2010)	ES	(Paiva et al. 2009)
Colomesus asellus (Müller & Troschel, 1848)	IN	(Bartolette et al. 2018)	FS	-
Colomesus psittacus (Bloch & Schneider, 1801)	ZB	(Lobato et al. 2018)	ES	(Barletta-Bergan et al. 2002; Zacardi et al. 2016)
Conodon nobilis Linnaeus, 1758	ZB	(Lopes et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Cosmocampus elucens (Poey, 1868)	ZB	(Carpenter 2003b)	MS	(Passos et al. 2013)
Ctenogobius boleosoma (Jordan & Gilbert, 1882)	DV	(Vasconcelos Filho et al. 2009)	ES	(Vasconcelos Filho, Oliveira, 1999)
Ctenogobius saepepallens (Gilbert & Randall, 1968)	ZB	(Randall, 2004)	MS	(Baldwin, Smith, 2003; Ross, Rhode, 2004)
Ctenogobius shufeldti (Jordan & Eigenmann, 1887)	OV	(Contente et al. 2012)	ES	(Wyanski, Targett, 2000)
Ctenogobius smaragdus (Valenciennes, 1837)	DV	(Passos et al. 2013)	ES	(Vasconcelos Filho, Oliveira, 1999)
Ctenogobius stigmaticus (Poey, 1860)	DV	(Passos et al. 2013)	ES	(Vasconcelos Filho, Oliveira, 1999)
Cynoscion acoupa (Lacepède, 1800)	PV	(Ferreira et al. 2016)	MM	(Passos et al. 2013)
Cynoscion leiarchus (Cuvier, 1830)	ZB	(Araújo et al. 2016)	MM	(Chao, 1978)
Cynoscion virescens (Cuvier, 1830)	-	-	MM	(Paiva et al. 2009)
Dactylopterus volitans Linnaeus, 1758	ZB	(Guedes et al. 2015)	MS	(Paiva et al. 2009)
Dactyloscopus crossotus Starks, 1913	-	-	MS	(Herrema et al. 1985)
Diapterus auratus (Ranzani, 1840)	ZB	(Temóteo et al. 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)

Diapterus rhombeus (Cuvier, 1829)	ZP	(Temóteo et al. 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)
Echeneis neucrates Linnaeus, 1758	DV	(Williams et al. 2003)	MS	(Vasconcelos Filho, Oliveira, 1999)
Eleotris pisonis (Gmelin, 1789)	PV	(Gonçalves et al. 2018)	ES	(Nordlie, 1981; Winemiller, Ponwith, 1998)
Elops saurus Linnaeus, 1758	PV	(Robins, Ray, 1986)	MS	(Vasconcelos Filho, Oliveira, 1999)
Engraulis anchoita Hubbs & Marini 1935	ZP	(Vasconcellos et al. 1998)	MS	(Riede, 2004)
Epinephelus adscencionis (Osbeck, 1765)	ZB	(Medeiros et al. 2010)	MS	(Pereira et al. 2015)
Epinephelus itajara (Lichtenstein, 1822)	PV/OP	(Freitas et al. 2015)	MS	(Paiva et al. 2009)
Erotelis smaragdus (Valenciennes, 1837)	-	-	ES	(Vasconcelos Filho, Oliveira, 1999)
Etropus crossotus Jordan & Gilbert, 1882	ZB	(Paiva et al. 2008)	MM	(Oliveira, Favaro, 2011)
Etropus longimanus Norman, 1933	ZB	(Figueiredo, Menezes, 2000a)	MS	(Saad, Fagundes Netto, 1992; Derisio et al. 2012)
Eucinostomus argenteus (Baird & Girard, l854)	ZB	(Leão, 2016)	MM	(Vasconcelos Filho, Oliveira, 1999)
Eucinostomus gula (Quoy & Gaimard, 1824)	ZB	(Zahorcsak et al. 2000a)	MM	(Vasconcelos Filho, Oliveira, 1999)
Eucinostomus havana (Nichols, 1912)	ZB	(Froese, Pauly, 2018)	MM	(Passos et al. 2013)
Eucinostomus melanopterus (Bleeker, 1863)	ZB	(Ramos et al. 2011)	MM	(Chaves, Bouchereau 2000)
Eugerres brasilianus (Cuvier, 1830)	OV	(Vasconcelos Filho et al. 2009)	MM	(Vasconcelos Filho, Oliveira, 1999)
Evorthodus lyricus (Girard, 1858)	DV	(STRI, 2017)	MS	(Vasconcelos Filho and Oliveira 1999)
Fistularia petimba Lacepède, 1803	PV	(Kalogirou et al. 2007); (Paiva et al. 2009)	ES	(Passos et al. 2013)
Fistularia tabacaria Linnaeus, 1758	PV	(Fritzsche, 1990)	MS	(Vasconcelos Filho, Oliveira, 1999)
Genyatremus luteus Bloch, 1795	OP	(Almeida et al. 2005)	MS	(Vasconcelos Filho, Oliveira, 1999)
Gerres cinereus (Walbaum, 1792)	ZB	(Randall, Vergara 1978)	MM	(Halpern, 2004)
Gobioides broussonnetii Lacepède, 1800	DV	(Mata-Cortes et al. 2004)	ES	(Mourão et al. 2014)
Gobionellus oceanicus (Pallas, 1770)	DV	(Vasconcelos Filho et al. 2009)	ES	(Vasconcelos Filho, Oliveira, 1999)
Gobionellus stomatus Starks, 1913	DV	(Passos et al. 2013)	ES	(Vasconcelos Filho, Oliveira, 1999)
Guavina guavina (Valenciennes in Cuvier & Valenciennes, 1837)	ZB	(Teixeira, 1994)	ES	(Vasconcelos Filho, Oliveira, 1999)
Gymnothorax funebris Ranzani, 1839	ZB	(Carvalho-Filho, 1999)	MS	(Vasconcelos Filho, Oliveira, 1999)
Gymnothorax ocellatus Agassiz, 1831	ZB	(Santos, Castro, 2003)	MS	(Lieske, Myers, 1994)
Haemulon aurolineatum Cuvier, 1830	ZB	(Pereira et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Haemulon parra Desmarest, 1823	ZB	(Paiva et al. 2008)	MS	(Vasconcelos Filho, Oliveira, 1999)
Haemulon steindachneri Jordan & Gilbert, 1882	ZB	(Pereira et al. 2015)	MS	(Daros, 2014)
Haemulopsis corvinaeformis Steindachner, 1868	ZB	(Denadai et al. 2013)	MS	(Paiva et al. 2009)
Harengula clupeola (Cuvier, 1829)	ZP	(Paiva et al. 2008)	MS	(Vasconcelos Filho, Oliveira, 1999)
Harengula humeralis (Cuvier, 1829)	ZP	(Ortaz et al. 1996)	MM	(Bouchereau et al. 2008)

Hemiramphus brasiliensis (Linnaeus, 1758)	HV	(Schwamborn 2004)	MS	(Vasconcelos Filho, Oliveira, 1999)
Hippocampus erectus Perry, 1810	ZB	(Teixeira, Musick, 2001)	MS	(Vasconcelos Filho, Oliveira, 1999)
Hippocampus reidi Ginsburg, 1933	ZP	(Castro et al. 2008)	MM	(Vasconcelos Filho, Oliveira, 1999)
Holocentrus adscensiones (Osbeck, 1765)	ZB	(Fischer et al. 1981)	MS	(Silva Júnior et al. 2015)
Hypanus americanus (Hildebrand & Schroeder, 1928)	ZB	(Stehmann et al. 1978)	MM	(Fuentes et al. 2019)
Hypanus guttatus (Bloch & Schneider, 1801)	ZB	(Anderson et al. 2015)	MS	(Uyeno et al. 1983)
Hyporhamphus roberti (Valenciennes, 1847)	HV/OP	(Medeiros et al. 2017)	MM	(Díaz-Ruiz, 2003)
Hyporhamphus unifasciatus (Ranzani, 1841)	OV	(Ferreira, 2018)	MM	(Vasconcelos Filho, Oliveira, 1999)
Isopisthus parvipinnis (Cuvier, 1830)	PV	(Lira et al. 2017)	MM	(Silva Júnior et al. 2015)
Lagocephalus laevigatus (Linnaeus, 1766)	HV	(Denadai et al. 2012)	MM	(Andrade et al. 2015)
Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)	HV	(Sales, 2015)	MM	(Vasconcelos Filho, Oliveira, 1999)
Lobotes surinamensis (Bloch, 1790)	PV	(Franks et al. 2003)	MS	(Vasconcelos Filho, Oliveira, 1999)
Lutjanus alexandrei Moura & Lindeman, 2007	ZB	(Moraes, 2012)	MS	(Fernandes et al. 2012)
Lutjanus analis (Cuvier, 1828)	ZB	(Freitas et al. 2011)	MS	(Vasconcelos Filho, Oliveira, 1999)
Lutjanus cyanopterus (Cuvier, 1828)	ZB	(Allen, 1985)	MS	(Bastos et al. 2013)
Lutjanus jocu (Bloch & Schneider, 1801)	ZB	(Monteiro et al. 2009)	MS	(Vasconcelos Filho, Oliveira, 1999)
Lutjanus synagris (Linnaeus, 1758)	ZB	(Freitas et al. 2011)	MS	(Vasconcelos-Filho, Oliveira, 2000)
Lycengraulis grossidens (Spix & Agassiz, 1829)	PV	(Bortoluzzi et al. 2006)	ES	(Mai, Vieira, 2013)
Macrodon ancylodon (Bloch & Schneider, 1801)	PV	(Figueiredo et al. 2014)	MM	(Militelli, Macchi, 2004)
Megalops atlanticus Valenciennes, 1847	PV	(Cataño, 1994)	MM	(Rickards, 1968)
Menticirrhus americanus (Linnaeus, 1758)	ZB	(Rondineli et al. 2007)	MM	(Turra et al. 2012)
Microgobius meeki Evermann & Marsh, 1900	ZB	(Froese, Pauly, 2018)	MS	(WoRMS, 2020)
Microphis lineatus (Kaup, 1856)	ZP	(Teixeira, Perrone, 1998)	ES	(Miranda-Marure et al. 2004)
Micropogonias furnieri (Desmarest, 1823)	ZB	(Mendoza-Carranza, Vieira 2008)	MM	(Paiva et al. 2009)
Mugil brevirostris (Ribeiro, 1915)	-	-	MM	(Dantas et al. 2015)
Mugil curema Valenciennes, 1836	DV	(Passos et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Mugil curvidens Valenciennes, 1836	DV	(Passos et al. 2013)	-	-
Mugil incilis Hancock, 1830	DV	(Passos et al. 2013)	MM	(Dantas et al. 2015)
Mugil liza Valenciennes, 1836	DV	(Cervigón, 1993)	MM	(Vasconcelos Filho, Oliveira, 1999)
Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007	-	-	MM	(Dantas et al. 2015)
Mycteroperca bonaci (Poey, 1860)	PV	(Daros, 2014)	MS	(Daros, 2014)
Myrichthys ocellatus (Lesueur, 1825)	ZB	(Luiz et al. 2008)	MS	(Monteiro-Neto et al. 2013)
Myrophis punctatus Lütken, 1852	ZB	(Vaslet et al. 2011)	MM	(Barletta et al. 2000)
Notarius grandicassis (Valenciennes, 1840)	ZB	(Mendes, Barthem, 2010)	MM	(Marceniuk et al. 2017)
Ocyurus chrysurus (Bloch, 1791)	ZB	(Heck, Weinstein, 1989)	MS	(Vasconcelos Filho, Oliveira, 1999)
Ogcocephalus vespertilio (Linnaeus, 1758)	ZB	(Gibran, Castro, 1999)	MS	(Vasconcelos Filho, Oliveira, 1999)

Oligoplites palometa (Curvier, 1833)	PV	(Vasconcelos Filho et al. 2010)	MM	(Vasconcelos Filho, Oliveira, 1999)
Oligoplites saliens (Bloch, 1793)	PV	(Winik et al. 2007)	MM	(Vasconcelos Filho, Oliveira, 1999)
Oligoplites saurus (Bloch & Schneider, 1801)	PV	(Medeiros et al. 2017)	MM	(Vasconcelos Filho, Oliveira, 1999)
Ophichthus cylindroideus (Ranzani, 1839)	PV	(Giarrizzo, Krumme, 2007)	ES	(Giarrizzo, Krumme, 2007)
Ophichthys ophis (Linnaeus, 1758)	PV	(Randall, 1967)	MS	(Schneider, 1990)
Ophioscion punctatissimus Meek & Hildebrand, 1925	ZB	(Zahorcsak et al. 2000)	MM	(Spach et al. 2004)
Opisthonema oglinum (Lesueur, 1818)	ZP	(Vasconcelos-Filho, 1979)	MS	(Vasconcelos Filho, Oliveira, 1999)
Paralichthys brasiliensis (Ranzani, 1842)	ZB	(Froese, Pauly, 2018)	MM	(Vasconcelos Filho, Oliveira, 1999)
Peprilus paru Linnaeus, 1758	OV	(Passos et al. 2013)	MS	(Passos et al. 2013)
Phaeoptyx pigmentaria (Poey, 1860)	ZP	(Greenfield, Johnson, 1990)	MS	(Greenfield, Johnson, 1990)
Platanichthys platana (Regan, 1917)	ZP	(Aguiaro et al. 2003)	ES	(Aguiaro et al. 2003)
Poecilia vivipara (Bloch & Schneider, 1801)	ZP	(Passos et al. 2013)	FS	(Paiva et al. 2009)
Polydactylus virginicus (Linnaeus, 1758)	ZB	(Lopes et al. 1998)	MM	(Vasconcelos Filho, Oliveira, 1999)
Pomacanthus arcuatus (Linnaeus, 1758)	ZB	(Hourigan et al. 1989)	MS	(Gasparini et al. 2005)
Pomacanthus paru (Bloch, 1787)	ZB	(Hourigan et al. 1989)	MS	(Vasconcelos Filho, Oliveira, 1999)
Pomadasys croco (Cuvier, 1830)	ZB	(Froese, Pauly, 2018)	MS	(Riede, 2004)
Pomadasys ramosus Poey, 1860	ZB	(Silva et al. 2018)	MM	(Silva et al. 2018)
Prionotus punctatus (Bloch, 1793)	ZB	(Longo et al. 2015)	MS	(Vasconcelos Filho, Oliveira, 1999)
Pseudupeneus maculatus (Bloch, 1793)	ZB	(Dantas et al. 2012)	MS	(Vasconcelos Filho, Oliveira, 1999)
Rhinosardinia bahiensis (Steindachner, 1879)	ZP	(Clark, Pessanha, 2015)	ES	(Clark, Pessanha, 2015)
Rypticus randalli Courtenay, 1967	PV	(Medeiros et al. 2017)	MS	(Passos et al. 2013)
Rypticus saponaceus (Bloch & Schneider, 1801)	ZB	(Feitosa et al. 2012)	MS	(Bejarano et al. 2014)
Sciades herzbergii (Bloch, 1794)	ZB	(Medeiros et al. 2017)	ES	(Vasconcelos Filho, Oliveira, 1999)
Sciades parkeri (Trail, 1982)	ZB	(Vasconcelos Filho et al. 2003)	ES	(Betancur et al. 2008)
Sciades proops (Valenciennes, 1840)	ZB	(Guedes, Vasconcelos Filho, 1980)	ES	(Vasconcelos Filho, Oliveira, 1999)
Scomberomorus brasiliensis Collete, Russo & Zavala-Camin, 1978	PV	(Collette, Nauen, 1983)	MS	(Vasconcelos Filho, Oliveira, 1999)
Scomberomorus regalis (Bloch, 1793)	PV	(Collette, Nauen, 1983)	MS	(Riede, 2004)
Scorpaena plumieri Bloch, 1789	ZB	(Heck, Weinstein, 1989)	MS	(Edwards, 1990)
Selene brownii (Curvier, 1816)	ZB	(Bomfim, 2014)	MS	(WoRMS, 2020)
Selene vomer (Linnaeus, 1758)	PV	(Daros, 2014)	MS	(Vasconcelos Filho, Oliveira, 1999)
Serranus flaviventris (Cuvier, 1829)	OP	(Maia-Nogueira et al. 2009)	MS	(Lieske, Myers, 1994)
Sparisoma amplum (Ranzani, 1842)	HV	(Ferreira, Gonçalves, 2006)	MS	(Moura et al. 2001)
Sparisoma axillare (Steindachner, 1878)	HV	(Ferreira, Gonçalves, 2006)	MS	(Moura et al. 2001)
Sparisoma radians (Valenciennes, 1840)	HV	(Paiva et al. 2008)	MS	(Vasconcelos Filho, Oliveira, 1999)

Sphoeroides greeleyi Gilbert, 1900	ZB	(Figueiredo, Menezes, 2000)	ES	(Schultz et al. 2002)
Sphoeroides spengleri (Bloch, 1785)	ZB	(Targett, 1978)	ES	(Paiva et al. 2009)
Sphoeroides testudineus (Linnaeus, 1758)	ZB	(Vasconcelos Filho et al. 1998)	ES	(Vasconcelos Filho, Oliveira, 1999)
Sphyraena barracuda (Edwards, 1771)	PV	(Akadje et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Sphyraena guachancho Cuvier, 1829	PV	(Lopes et al. 2012)	MS	(Bonecker et al. 2014)
Stellifer brasiliensis (Schultz, 1945)	ZB	(Passos et al. 2013)	MM	(Vasconcelos Filho, Oliveira, 1999)
Stellifer microps (Steindachner, 1864)	ZB	(Giarrizzo, Krumme, 2007)	ES	(Barletta, Blaber, 2007)
Stellifer rastrifer (Jordan, 1889)	ZB	(Passos et al. 2013)	MM	(Passos et al. 2013)
Stellifer stellifer (Bloch, 1790)	ZB	(Pombo et al. 2013)	ES	(Dantas et al. 2012)
Strongylura marina (Walbaum, 1792)	PV	(Passos et al. 2013)	MM	(Passos et al. 2013)
Strongylura timucu (Walbaum,1792)	PV	(Passos et al. 2013)	MM	(Paiva et al. 2009)
Syacium micrurum Ranzani, 1842	ZB	(Soares, 1997)	MM	(Vasconcelos Filho, Oliveira, 1999)
Symphurus diomedeanus (Goode & Bean, 1885)	ZB	(Almeida, 2018)	MM	(Jaureguizar et al. 2003)
Symphurus plagusia (Bloch & Schneider, 1801)	ZB	(Vasconcelos Filho et al. 2003)	ES	(Paiva et al. 2009)
Symphurus tessellatus (Quoy & Gaimard, 1824)	ZB	(Guedes et al. 2004)	ES	(Paiva et al. 2009)
Syngnathus pelagicus Linnaeus, 1758	ZB	(Carpenter, 2003)	MS	(Passos et al. 2013)
Synodus foetens (Linnaeus, 1766)	PV	(Cruz-Escalona et al. 2005)	MS	(Vasconcelos Filho, Oliveira, 1999)
Thalassophryne nattereri Steindachner, 1876	ZB	(Collette, 1966)	MS	(Vasconcelos Filho, Oliveira, 1999)
Trachinotus carolinus (Linnaeus, 1766)	ZB	(Stefanoni, 2008)	MM	(Denadai et al. 2013)
Trachinotus falcatus (Linnaeus, 1758)	ZB	(Hofling et al. 1998)	MS	(Vasconcelos Filho, Oliveira, 1999)
Trichiurus lepturus Linnaeus, 1758	PV	(Vasconcelos Filho et al. 2010)	MS	(Vasconcelos Filho, Oliveira, 1999)
Trinectes microphthalmus Chabanaud, 1928	ZB	(Contente et al. 2009)	MM	(Vasconcelos Filho, Oliveira, 1999)
Trinectes paulistanus (Miranda Ribeiro, 1915)	ZB	(Reis-Filho et al. 2011)	MM	(Passos et al. 2013)
Tylosurus acus acus (Lacepède, 1803)	PV	(Contente et al. 2009)	MS	(WoRMS, 2020)
Tylosurus crocodilus (Péron & Lesueur, 1821)	PV	(Blaber, 1990)	MM	(Favero et al. 2019)
Ulaema lefroyi (Goode, 1874)	ZB	(Silva et al. 2016)	ES	(Passos et al. 2013)

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Table II: Fishing gears used throughout the sampling sites.

Estuaries	Fishing Gears
Santa Cruz	Block Net and Seine
Jaguaribe	Beach Seine
Suape	Block Net and Beach Seine
Sirinhaém	Beach Seine and Block Net
Maracaípe	Beach Seine
Rio Formoso	Block Net

4.1. Estuarine fishes of Northeast Brazil with notes on species ecology, conservation, and updated checklist

Estuarine fishes of Northeast Brazil with notes on species ecology, conservation, and updated checklist

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Abstract

Estuaries are dynamic physical-chemical unique environments, being among the most productive ecosystems on Earth as well as an important ecotone. The feeding mode (FMFG), estuarine use functional groups (EUFG) and a conservation status, according to the categories used in the International Union for Conservation of Nature Red List of threatened species and Chico Mendes Institute for Biodiversity Conservation were assigned to each fish species reported in estuaries along the coast of Northeast Brazil, to better understand the structure and functioning of the studied areas. A total of 339 species, distributed in 37 orders and 89 families were identified in the studied estuaries. Marine stragglers and migrants were 77% of the total and zoobenthivorous and piscivorous fishes represented 72% of the total number of species. Higher similarities were found between the states of Maranhão, Ceará, Paraíba, Pernambuco and Bahia, and a second group that

englobed the estuaries of Rio Grande do Norte based on the multivariate analysis. The present study provides an updated checklist with records on habitat and conservation status that might support and increase the knowledge in fisheries management, development, and conservation of marine aquatic resources in coastal areas of Northeast Brazil.

Key words

Guilds, IUCN, ICMbio, ichthyofauna, biodiversity, sustainability

Introduction

Estuaries are dynamic physical-chemical unique environments, being among the most productive ecosystems on Earth (Mateus et al. 2008; Costanza et al. 2014; Vasconcelos et al. 2015; Loureiro et al. 2016). They also perform crucial ecological functions such as pollutant filtration, flood control, biodiversity preservation, and nutrient recycling (Harrison and Whitfield 2021; Roshni et al. 2021a). According to Zapata et al. (2018a), tropical estuaries hold an important role on Earth, given their great rates of primary and secondary production and microhabitats' s diversity. As a consequence of the growth of anthropogenic actions such as urbanization, expansion of industries, and aquaculture, the structure and functioning of these ecosystems are changing (e.g. modification in the sediment's transport caused by alterations in estuary's morphology) (Zapata et al. 2018b; Lessa 2020; Roshni et al. 2021b), threatening the ecological function of these ecosystems which is directly important to the well-being of the society (Blaber 2000), giving their multiples ecosystem services.

The Brazilian coastline has different characteristics in its interface zone from the continent to the ocean (Bernardes et al. 2012). The northeast region of Brazil comprehends nine coastal states with an extension of almost 3400 km (Pinheiro et al. 2008), being the longest coastline of the country, encompassing a high diversity of oceanographic and geomorphologic characteristics and fish communities (Pinheiro et al. 2008; Barletta and Lima 2019), which tend to fluctuate throughout the year due to the interannual climate variability, temperature, currents, and salinity. Studies aiming at characterizing the structure of fish communities in estuaries are extremely important to understand their functioning and influence in the ecosystem (Potter et al. 2011; Bruno et al. 2013; Lessa 2020), but are still fragmented and punctual.

In this study, we provide an estimation of the fish biodiversity along 45 estuaries in the northeast coast of Brazil based on an extensive, but not exhaustive, literature review involving research from the 70s until nowadays. Compiling this information is important for a better comprehension of the importance of estuaries for biodiversity and maintenance of daily lives of traditional populations along with the aesthetic point of view on fish diversity in the Northeast estuaries of Brazil.

Material and Methods

The study area comprehends 45 estuaries located along the nine states of the Northeast coastal region of Brazil (Fig. 1). A literature review based on articles, books, monographs, dissertations, and theses was used to compile a checklist.

According to Lins Oliveira et al. (1999), the studied estuaries comprehends the São Marcos Bay in the state of Maranhão to Todos os Santos Bay, in the state of Bahia. It can be divided into two main subregions. The first one is the semi-arid coast located in the northwest of Calcanhar Cape and the second is known as the oriental Northeastern Coast, located from Calcanhar Cape to Todos os Santos Bay. The semi-arid coast has mobile and fixed dunes, natural beach trays, and sandstones. This region presents strong winds that are responsible for shaping the Lençóis Maranhenses, a developed eolian dune fields (Lins Oliveira et al. 1999; Suguio et al. 2011). The geological characteristics of the oriental Northeastern Coast are basically within the same scope as the first area, however with the domination of beach-rick reefs (Suguio et al. 2011).

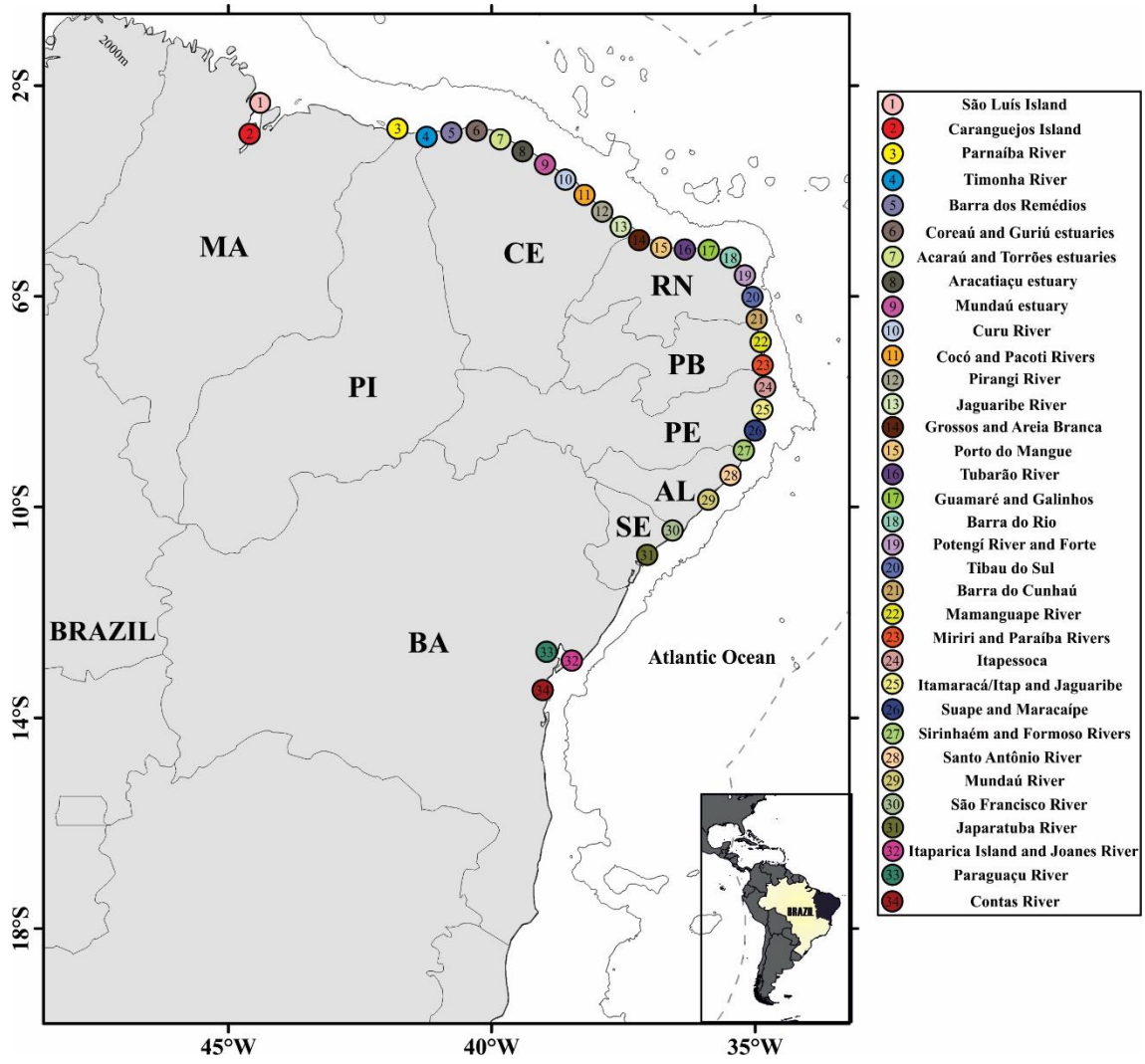

Fig. 1 Estuaries of São Luís (1) and Caranguejos Islands (2)- MA, Parnaíba (3) and Timonha Rivers (4) - PI, Barra dos Remédios (5); Coreaú and Guriú (6); Acaraú and Torrões (7); Aracatiaçu (8); Mundaú (9); Curu River (10); Cocó and Pacoti Rivers (11); Pirangi River (12); Jaguaribe River (13) – CE, Grossos and Areia Branca (14); Porto do Mangue (15); Tubarão River (16); Guamaré and Galinhos (17); Barra do Rio (18); Potengí River and Forte (19); Tibau do Sul (20); Barra do Cunhaú (21) – RN, Mamamguape River (22); Miriri and Paraíba Rivers (23) – PB, Itapessoca (24); Itamaracá/Itapissuma and Jaguaribe Rivers (25); Suape and Maracaípe (26); Sirinhaém and Formoso Rivers (27) – PE, Santo Antônio River (28); Mundaú River (29) – AL, São Francisco River (30); Japaratuba River (31) – SE, Itaparica Island and Joanes River (32); Paraguaçu River (33) and Contas River (34) – BA located in Northeast Brazil.

According to the systematic organization proposed by Nelson et al. (2016), species richness is presented in three levels: order, family, and species. The nomenclature

of species was revised through the Eschmeyer Fish Catalogue (Fricke, R., Eschmeyer, W. N. & Van der Laan 2020) and the World Register of Marine Species (WoRMS 2020). In addition, the original name of the species found within the literature is included (Supplementary Material Table II).

Fish species were analyzed as presence/absence data and classified to their use of estuaries based on the functional guild approach (Elliott et al. 2007) (Supplementary Material Table I): the Estuarine Use Functional Group (EUFG) and the Feeding Mode Functional Group (FMFG) (Elliott et al. 2007). EUFG allows the understanding of the use of estuaries by fishes and how important these environments are. Concerning this guild, species were categorized as marine stragglers (MS), marine migrants (MM), estuarine species (ES), freshwater species (FS), freshwater migrants (FM), amphidromous (AM), anadromous (AN) and catadromous species (CA) (Elliot et al, 2007). FMFG characterizes the feeding habit of a species, also based on Elliott et al. (2007), such as zoobenthivore (ZB), piscivore (PV), zooplanktivore (ZP), herbivore (HV), omnivore (OV), detritivore (DV) and opportunistic (OP). An extensive literature review, totalizing more than 230 references, was used to define the functional guilds (Supplementary Material Table I) (see Elliott et al. 2007 for a detailed description of each trophic category).

According to the categories based in the International Union for Conservation of Nature (IUCN) Red List criteria of threatened species, as well as those categorized at Brazilian level (ICMbio 2018), fish species in this study were assigned to 10 categories: extinct (EX), regionally extinct (RE), extinct in the wild (EW), critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE). A circle barplot was made for a better visualization of how these categories were divided, with the highest and lowest observations being displayed across the groups.

A heatmap displaying estuaries x guild proportion along with an Agglomerative Hierarchical Cluster (AHC) were performed using the Ward´s minimum variance method based on a Euclidian distance matrix. Furthermore, pursuing a better understanding between similarities among the fish assemblages and estuaries, a Non-metric Multidimensional Scaling (nMDS) using a Sorensen similarity matrix from species presence/absence data, and a cluster analysis using the average linkage method were

carried out. Finally, a permutational multivariate analysis of variance (PERMANOVA) was performed to show differences of richness amid estuaries (Clarke and Warwick 2001). All statistical analyses were performed using the vegan (Oksanen et al. 2019), ggplot2 (Wickham 2016), viridis (Garnier et al. 2021) and stats (R Core 2019) packages from Team (2020).

Results

A total of 339 fish species, distributed in 37 orders and 89 families were identified in the studied estuaries (Table I, II, III, IV and V). The richest family was Sciaenidae comprising 25 species (7 % of total), followed by Carangidae and Gobiidae (16 species), Engraulidae (14 species), Haemulidae and Serranidae (13 species), Ariidae (12 species) and Paralichthyidae (11 species). The remaining 82 families had less than 10 species each. The state of Pernambuco was the most diverse in terms of species, comprehending 237, followed by Ceará (163 species), Bahia (156 species), Rio Grande do Norte (154 species), Paraíba (147 species), Maranhão (124 species), Alagoas (58 species), Piauí (53 species) and Sergipe (43 species).

Most of species were classified as Least Concern according to the IUCN (74.7%) (Fig. 2) and ICMbio (72.6%) (Fig. 3) conservation status. A total of 21 species (IUCN) and 20 species (ICMbio) were identified under some degree of threat (Fig. 2 and 3): seven as EN (*Sphyrna tiburo* (IUCN), *Pseudobatos percellens* (IUCN), *Hypanus marianae* (IUCN), *Aetobatus narinari* (IUCN) and *Mobula hypostoma* (IUCN), *Hyporthodus nigrutus* (ICMbio) and *Pogonias cromis* (ICMbio); seven as CR (*Carcharhinus porosus* (IUCN and ICMbio), *Isogomphodon oxyrhynchus* (IUCN and ICMbio), *Sphyrna lewini* (IUCN and ICMbio), *Sphyrna tudes* (IUCN and ICMbio), *Pristis pristis* (IUCN and ICMbio), *Fontitrygon geijskesi* (IUCN), *Epinephelus itajara* (ICMbio); and 15 as VU (*Ginglymostoma cirratum* (IUCN and ICMbio), *M. hypostoma* (ICMbio), *Rhizoprionodon lalandii* (IUCN), *Rhizoprionodon porosus* (IUCN), *Rhinoptera bonasus* (IUCN), *Megalops atlanticus* (IUCN and ICMbio), *Sciades parkeri* (IUCN and ICMbio), *Achirus mucuri* (ICMbio), *Hippocampus erectus* (IUCN and ICMbio), *Hippocampus reidi* (ICMbio), *Sparisoma axillare* (ICMbio), *E. itajara* (IUCN), *Epinhephelus marginatus* (IUCN and ICMbio), *Mycteroperca bonaci* (ICMbio) and *Lutjanus cyanopterus* (IUCN and ICMbio). In addition, 25 species were classified as NT:

Carcharhinus leucas (IUCN and ICMbio), *Carcharhinus limbatus* (IUCN and ICMbio), *R. lalandii* (ICMbio), *Narcine brasiliensis* (IUCN), *Hypanus americanus* (IUCN), *Hypanus guttatus* (IUCN), *Hypanus say* (IUCN), *Gymnura micrura* (IUCN and ICMbio), *Bagre bagre* (ICMbio), *Dormitator maculatus* (ICMbio), *Mugil liza* (ICMbio), *Hyporhamphus unifasciatus* (ICMbio), *Albula vulpes* (IUCN), *H. reidi* (IUCN), *H. nigritus* (IUCN), *Sparisoma amplum* (ICMbio), *M. bonaci* (IUCN), *Mycteroperca venenosa* (IUCN), *Lutjanus analis* (IUCN and ICMbio), *Lutjanus jocu* (ICMbio), *Lutjanus synagris* (IUCN and ICMbio), *Ocyurus chrysurus* (ICMbio), *Cynoscion acoupa* (ICMbio), *Balistes vetula* (IUCN and ICMbio) and *Aluterus monocerus* (ICMbio). It was also observed 40 (ICMbio) and 10 (IUCN) species were recognized as DD (Table I, II, III, IV and V).

Assessing by estuary, four showed a higher percentage than the others within the endangered species categories; the estuary of São Luís in the state of Maranhão (12% - IUCN and 10% - ICMbio of the total number of species in the estuary); the Guamaré estuary in the state of Rio Grande do Norte (7% - ICMbio of the total number of species in the estuary); Pirangí in the state of Ceará and Porto do Mangue in Rio Grande do Norte, both presented a percentage of 6% of the total number of species in each estuary (ICMbio). São Luís had 13% (ICMbio) and 3% (IUCN) of its species classified as DD, while the estuary of Mamamguape had 12% of its species categorized as DD (ICMbio).

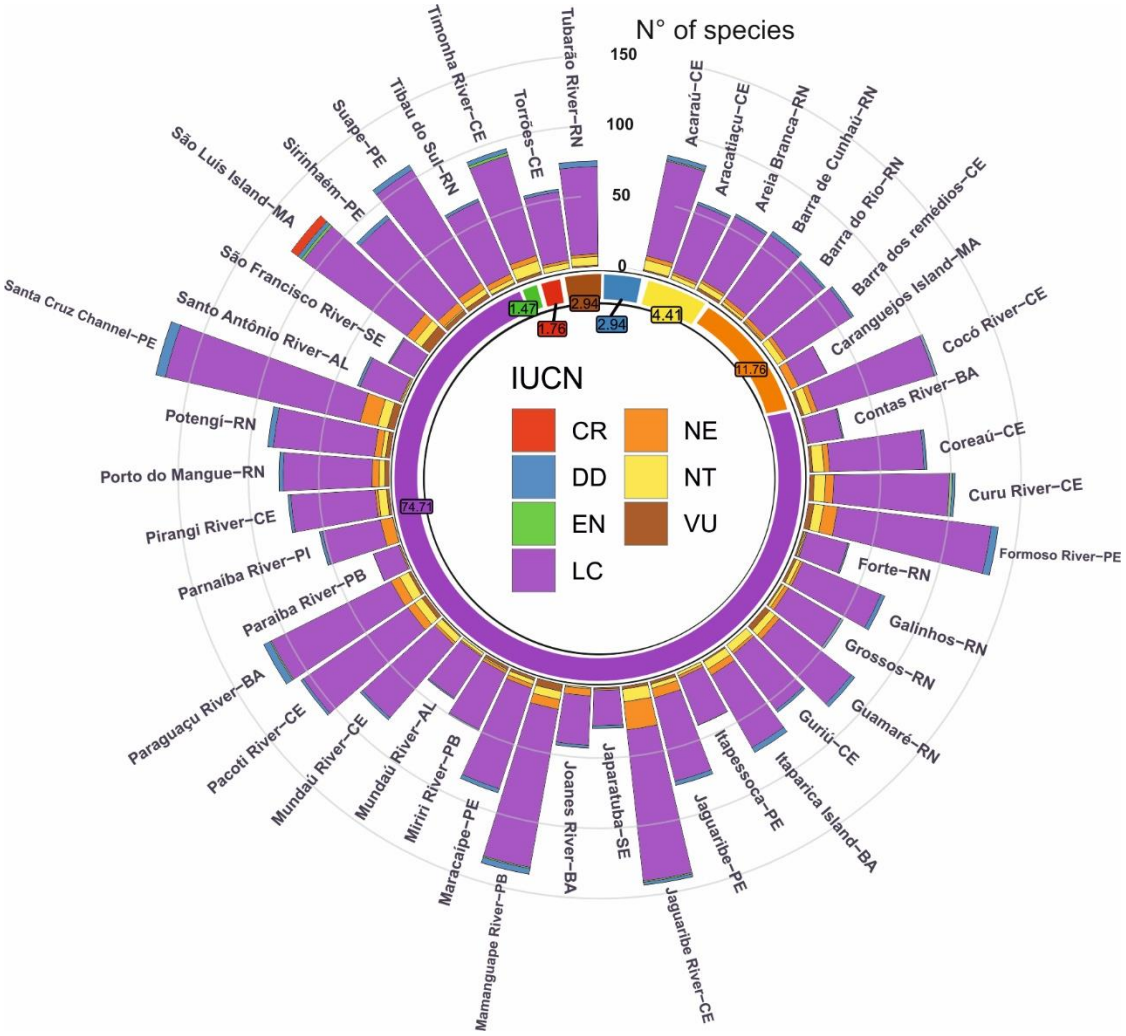

Fig. 2 Number of fish species from each IUCN categories for the studied estuaries along the northeastern coast of Brazil. Endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

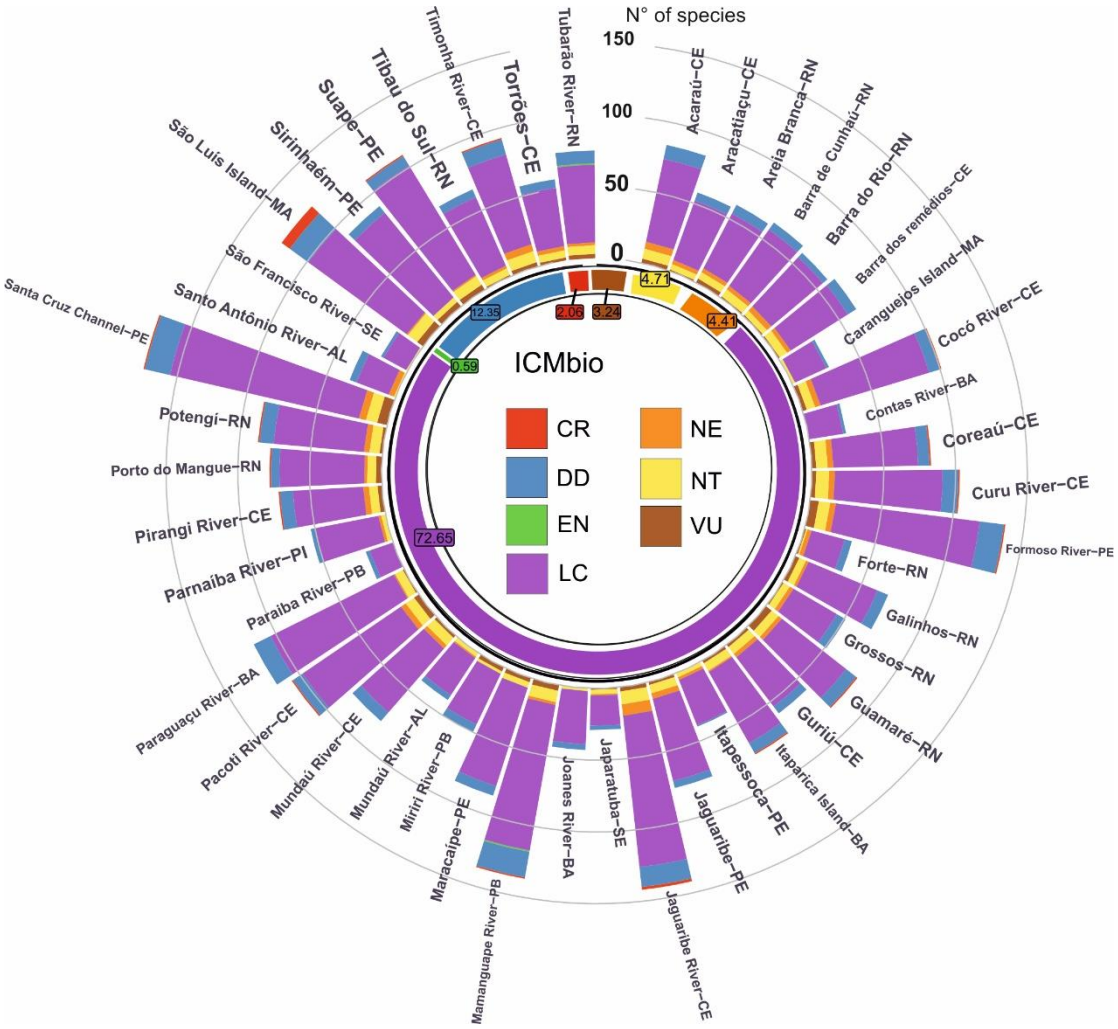

Fig. 3 Number of fish species for each ICMbio categories for the studied estuaries along the northeastern coast of Brazil. Endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

Considering the Estuarine Use Functional Group (EUFG), most of the species belonged to the marine ecosystem: marine stragglers (48% of the total number of species) and marine migrants (29.1% of the total number of species) (Supplementary Material Table I, Fig. 4). Estuarine species were 14% (47 species), while freshwater species was only 7.5% (26 species) and freshwater migrants were only 2% (8 species). It was also found two amphidromous species (*Awaous tajasica* present only on RN) and *Dormitator maculatus* (present in three of the studied states: CE, RN and PE), and one anadromous species (*Microphis brachyurus brachyurus* present on two of the studied states: CE and PB), one catadromous species (*Mugil liza* present on seven of the studied states: MA, CE, RN, PE, AL, SE and BA). When evaluating each estuary alone, the same result was found

when considering the EUFG. Most of the species were classified as marine stragglers and migrants varying from 18% (Caranguejos estuary/MA) to 56% (Mundaú estuary/AL) of the total number of species within the estuary itself.

Considering the Feeding Mode Functional Group (FMFG), most of the species were classified as zoobenthivorous (44%), followed by piscivorous (28%) and zooplantivorous fishes (9%) (Supplementary Material Table I). When analyzing by estuary, this same pattern of feeding habit was also found (Fig. 5). Due to the lack of information, a total of 17 species were not assigned to any functional group in either estuarine habitat use pattern or feeding habit.

Two main groups were formed in the dendrograms´ groupings from the EUFG and FMFG. In the first one, for the EUFG, it was included all the estuaries from the state of Ceará, as well as one estuary from Rio Grande do Norte (Potengí); two estuaries from Pernambuco (Santa Cruz and Formoso River); both estuaries from Maranhão; the only estuary from Piauí and one estuary from Bahia (Joanes River). The second group was formed by all of estuaries from the state of Paraíba and Alagoas; the remaining estuaries of Pernambuco (Itapessoca, Suape, Sirinhaém, Maracaípe and Jaguaribe), Paraíba (Forte, Galinhos, Barra do Rio, Tubarão, Guamaré, Galinhos, Grossos, Areia Branca, Cunhaú and Tibaú do Sul) and Bahia (Paraguaçu, Contas and Itaparica), and one estuary from Sergipe (São Francisco). Observing the groupings from the FMFG, the first group was formed by three estuaries from Ceará (Guriú, Torrões and Aracatiaçu); two estuaries from Paraíba (Paraíba and Miriri), Alagoas (Santo Antônio and Mundaú), Bahia (Contas and Joanes), Sergipe (São Francisco and Japaratuba), and Pernambuco (Itapessoca and Jaguaribe), the only estuary from Piauí and one estuary from Maranhão (Caranguejos). The second group had the remaining estuaries from six states (Maranhão, Ceará, Rio Grande do Norte, Paraíba, Pernambuco and Bahia).

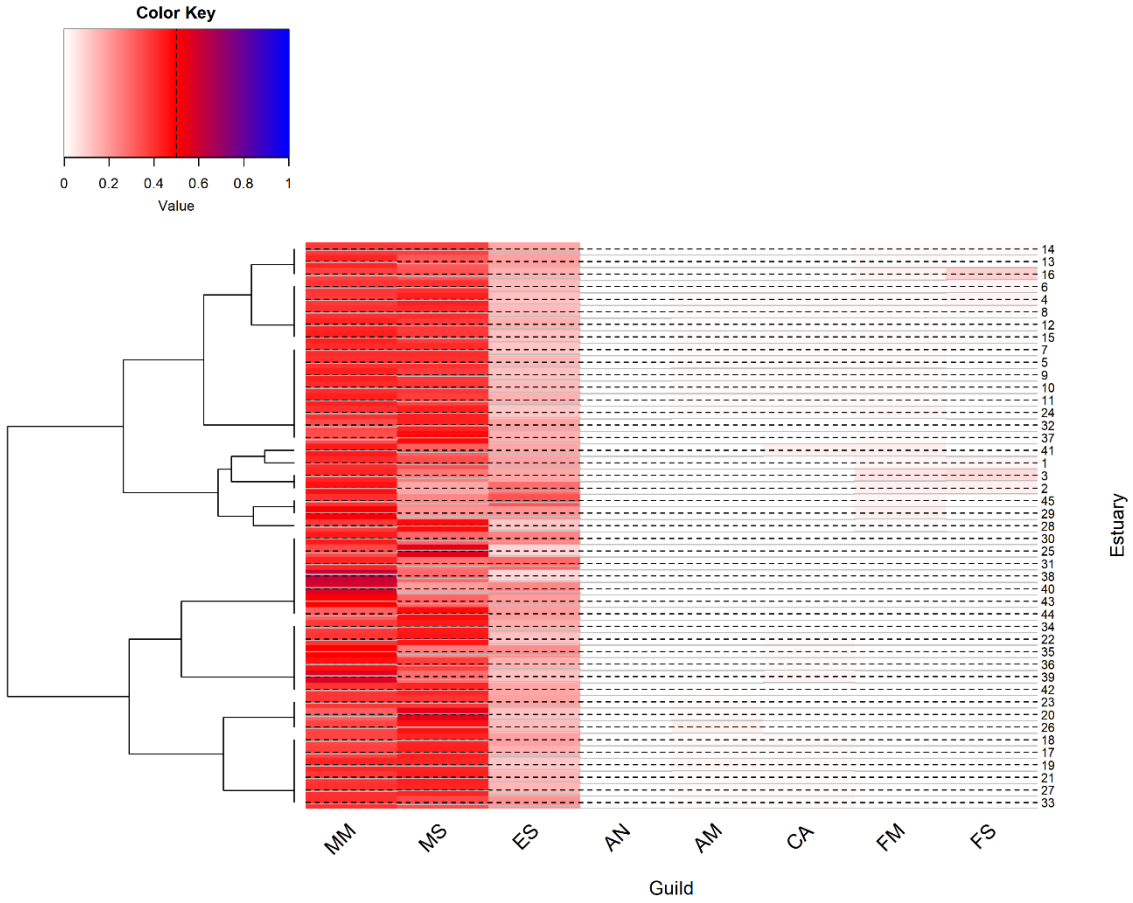

Fig. 4 Percentage of each EUFG categories marine migrant (MM), marine stragglers (MS), estuarine fishes (ES), anadromous species (AN), amphidromous (AM), catadromous (CA), freshwater migrants (FM) and freshwater species (FS) for the estuaries of São Luís Island (1), Caranguejos Island (2), Parnaíba River (3), Timonha River (4), Barro dos Remédios (5), Coreaú (6), Guriú (7), Acaraú (8), Torrões (9), Aracatiaçu (10), Mundaú River- CE (11), Curu River (12), Cocó River (13), Pacoti River (14), Pirangi River (15), Jaguaribe River – CE (16), Grossos (17), Areia Branca (18), Porto do Mangue (19), Tubarão River (20), Guamaré (21), Galinhos (22), Barra do Rio (23), Potengí (24), Forte (25), Tibau do Sul (26), Barra de Cunhaú (27), Mamanguape River (28), Miriri River (29), Paraíba River (30), Itapessoca (31), Santa Cruz (32), Jaguaribe- PE (33), Suape (34), Sirinhaém (35), Maracaípe (36), Formoso River (37), Santo Antônio River (38), Mundaú River – AL (39), São Francisco River (40), Japaratuba (41), Paraguaçu River (42), Contas River (43), Itaparica Island (44) and Joanes River (45).

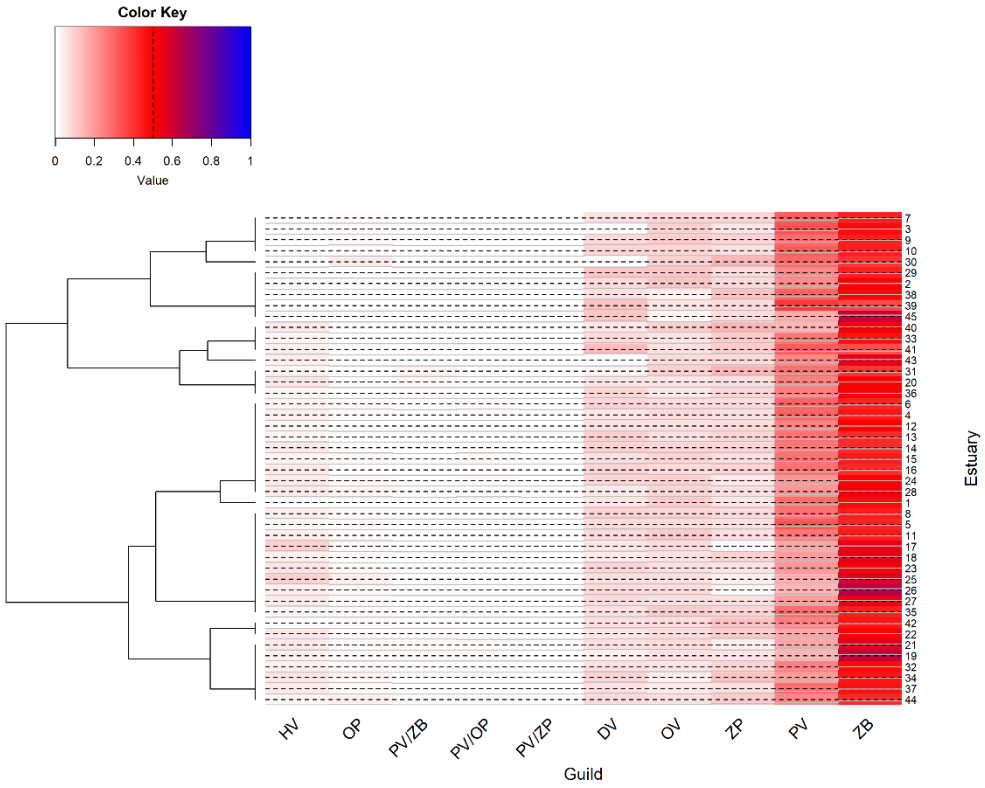

Fig. 5 Percentage of each FMFG categories zoobenthivore (ZB), piscivore (PV), zooplanktivore (ZP), herbivore (HV), omnivore (OV), detritivore (DV) and opportunistic (OP) for the estuaries of São Luís Island (1), Caranguejos Island (2), Parnaíba River (3), Timonha River (4), Barro dos Remédios (5), Coreaú (6), Guriú (7), Acaraú (8), Torrões (9), Aracatiaçu (10), Mundaú River- CE (11), Curu River (12), Cocó River (13), Pacoti River (14), Pirangi River (15), Jaguaribe River – CE (16), Grossos (17), Areia Branca (18), Porto do Mangue (19), Tubarão River (20), Guamaré (21), Galinhos (22), Barra do Rio (23), Potengí (24), Forte (25), Tibau do Sul (26), Barra de Cunhaú (27), Mamanguape River (28), Miriri River (29), Paraíba River (30), Itapessoca (31), Santa Cruz (32), Jaguaribe- PE (33), Suape (34), Sirinhaém (35), Maracaípe (36), Formoso River (37), Santo Antônio River (38), Mundaú River – AL (39), São Francisco River (40), Japaratuba (41), Paraguaçu River (42), Contas River (43), Itaparica Island (44) and Joanes River (45).

The nMDS and Cluster analysis based on the taxonomic composition of each estuary showed similar results between groupings. The cluster analysis, with the resemblance level of 40%, showed twelve groups, however, it is possible to see two wider

ones: one formed by the estuaries of Rio Grande do Norte and the second one by the estuarine regions of Maranhão, Ceará, Paraíba, Pernambuco and Bahia states (Figure 6). Even though the nMDS did not clearly separate the wider groups observed in the cluster analysis, it is still possible to see the proximity between the groupings within the estuaries located in the same state and the ones between the estuaries of Ceará, Pernambuco and Rio Grande do Norte (Figure 7).

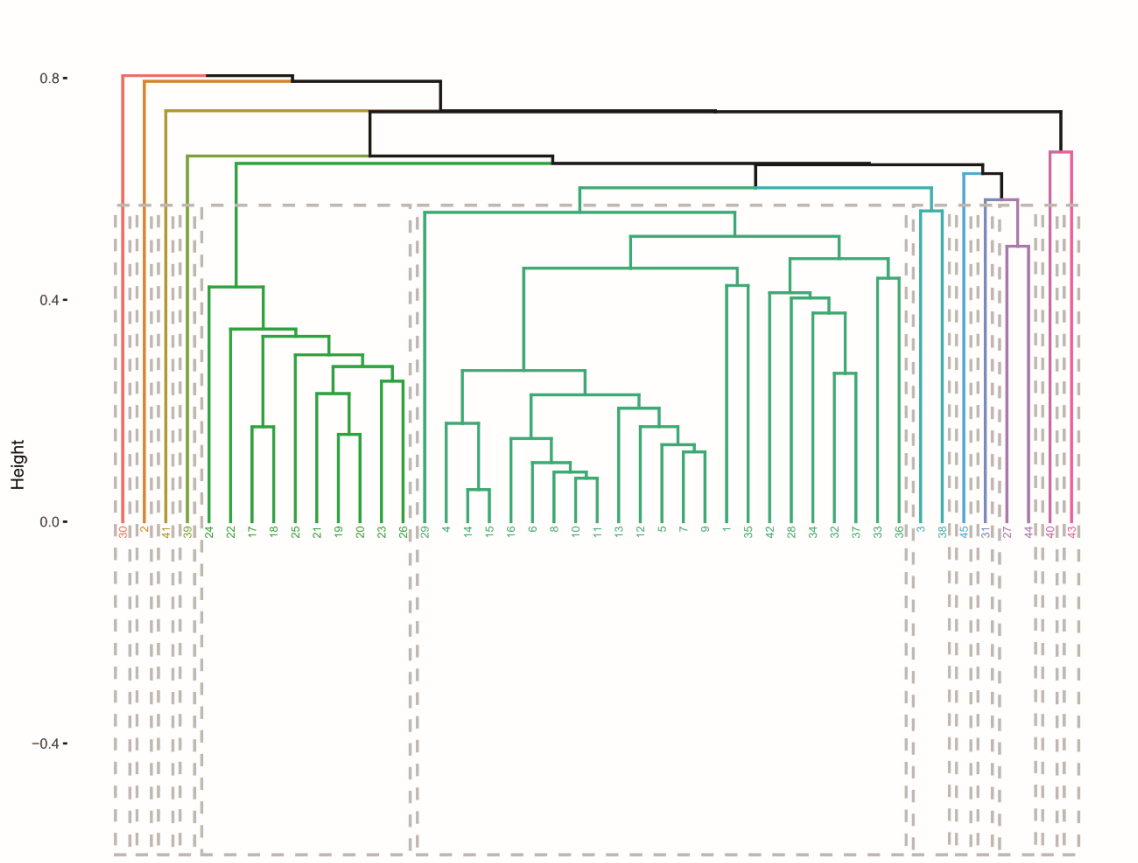

Fig. 6 Cluster analysis based on species records by estuaries. São Luís Island (1), Caranguejos Island (2), Parnaíba River (3), Timonha River (4), Barro dos Remédios (5), Coreaú (6), Guriú (7), Acaraú (8), Torrões (9), Aracatiaçu (10), Mundaú River- CE (11), Curu River (12), Cocó River (13), Pacoti River (14), Pirangi River (15), Jaguaribe River – CE (16), Grossos (17), Areia Branca (18), Porto do Mangue (19), Tubarão River (20), Guamaré (21), Galinhos (22), Barra do Rio (23), Potengí (24), Forte (25), Tibau do Sul (26), Barra de Cunhaú (27), Mamanguape River (28), Miriri River (29), Paraíba River (30), Itapessoca (31), Santa Cruz (32), Jaguaribe- PE (33), Suape (34), Sirinhaém (35), Maracaípe (36), Formoso River (37), Santo Antônio River (38), Mundaú River – AL (39),

São Francisco River (40), Japaratuba (41), Paraguaçu River (42), Contas River (43), Itaparica Island (44) and Joanes River (45).

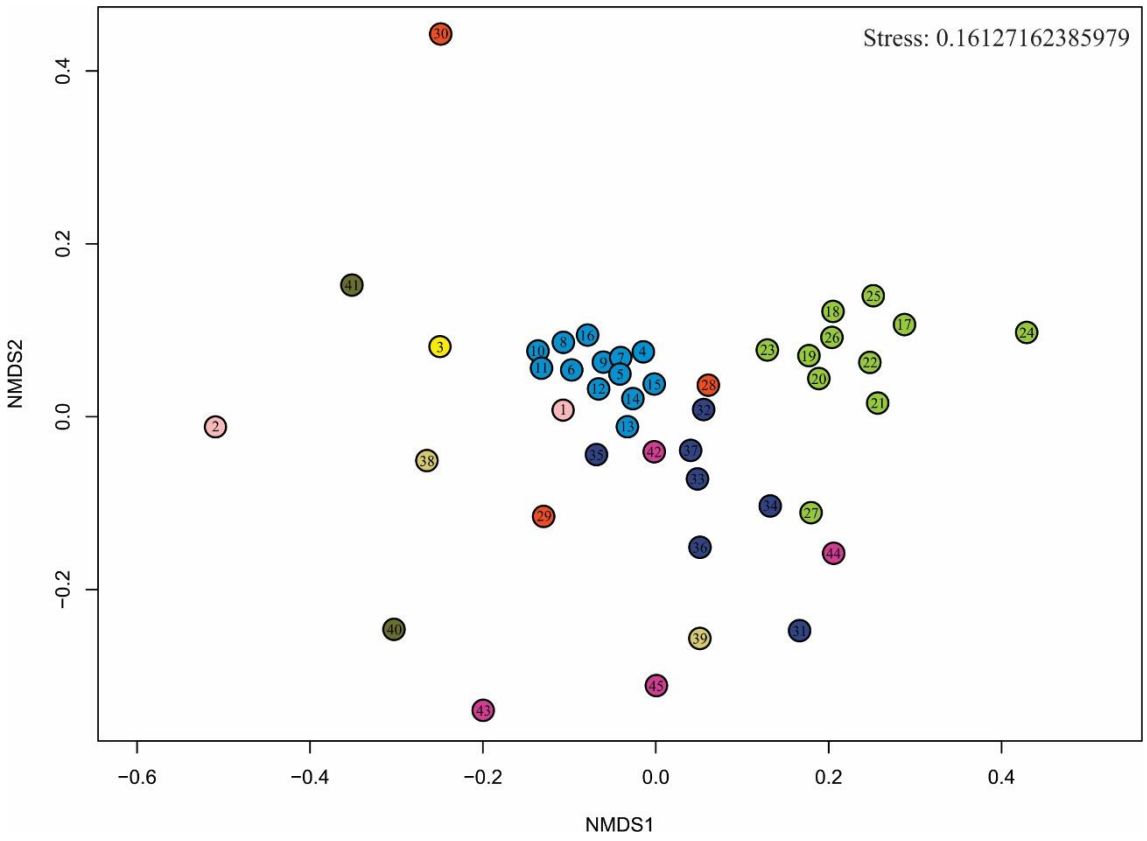

Fig. 7 Non-metric Multidimensional Scaling (nMDS) based on species records by estuaries. São Luís Island (1), Caranguejos Island (2), Parnaíba River (3), Timonha River (4), Barro dos Remédios (5), Coreaú (6), Guriú (7), Acaraú (8), Torrões (9), Aracatiaçu (10), Mundaú River- CE (11), Curu River (12), Cocó River (13), Pacoti River (14), Pirangi River (15), Jaguaribe River – CE (16), Grossos (17), Areia Branca (18), Porto do Mangue (19), Tubarão River (20), Guamaré (21), Galinhos (22), Barra do Rio (23), Potengí (24), Forte (25), Tibau do Sul (26), Barra de Cunhaú (27), Mamanguape River (28), Miriri River (29), Paraíba River (30), Itapessoca (31), Santa Cruz (32), Jaguaribe-PE (33), Suape (34), Sirinhaém (35), Maracaípe (36), Formoso River (37), Santo Antônio River (38), Mundaú River – AL (39), São Francisco River (40), Japaratuba (41), Paraguaçu River (42), Contas River (43), Itaparica Island (44) and Joanes River (45). States divided by colors: light blue: Ceará; green: Rio Grande do Norte; pink: Bahia; light

pink: Maranhão; yellow: Piauí; dark yellow: Alagoas; purple: Pernambuco; orange: Paraíba; and moss: Sergipe.

Discussion

Estuaries are important not only for their role as feeding, breeding, spawning, and sheltering grounds, but are also among the world´s most dynamic, productive, and ecologically notable ecosystems (Barletta et al. 2003; Vendel and Chaves 2006; NOAA 2019; Melo et al. 2021).

Our results identified a total of 339 fish species within the nine states located in northeastern Brazil evidencing a diverse and rich ichthyofauna even when compared with other studies including the whole Brazilian coast, such as Vilar and Joyeux (2018b) that found 796 estuarine fishes and 451 reported by Paiva et al. (2013). The number of fish species can be considered relatively low when compared with those studies, however, this reaffirms that the Northeast estuaries are understudied, as well as have a lower sampling effort which can be one of the reasons for this difference. Croakers are used for human consumption, in aquariums, and as part of the diet from other fish species. Jacks are used in aquariums and as part of human consumption. Gobies are mainly used in aquariums due to their different coloration and body format. Anchovies are largely used for human consumption and as animal food for other fish species. Haemulids and serranids are used in aquariums as well as for human consumption. Catfishes are mostly used as human consumption, and flounders are used as animal feed and human consumption (Sampaio De Souza and Júnior; Chao et al. 2015; Spier et al. 2018; Vicente et al. 2020). That result was also found in estuaries along the southeast and south of Brazil (Catelani et al. 2014; Santos et al. 2015; Spier et al. 2018), however, with a higher incidence of mullets (Mugilidae) and mojarras (Gerreidae) in an estuary in Santa Catarina (Branco et al. 2011), and mojarras and croakers in an estuary in São Paulo (Santos et al. 2015). It is also noteworthy to mention that these are the most common and important families found in estuarine and coastal systems (Passos et al. 2013a; Rotundo et al. 2020).

In the present study, *Sphoeroides testudineus* was found in 40 estuaries, *Centropomus undecimalis* and *Diapterus rhombeus* were found in 39, *Mugil curema* in 38, *Eucinostomus melanopterus* and *Lutjanus jocu* in 37, *Atherinella brasiliensis*,

Bathygobius soporator and *Pomadasys corvinaeformis* were found in 34, *Menticirrhus americanus* was found in 33, *Caranx latus* and *Micropogonias furnieri* were found in 31, and *Chaetodipterus faber*, *Cynoscion acoupa*, *Diapterus auratus*, *Eucinostomus argenteus*, *Mugil curvidens*, *Mugil liza*, *Oligoplites saurus* and *Opisthonema oglinum* were found in 30 estuaries. All of these species were present in either all states or at least seven of them. These results demonstrate the wide range in the spatial distribution of the estuarine ichthyofauna. On the other hand, the slender suckerfish (*Phtheirichthys lineatus*) was only found in one of the studied estuaries (Rio Formoso – PE). This can be possibly explained by the fact that this species inhabits coral reefs and that this region is part of the largest environmental protection area (APA Costa dos Corais) which has dense and diverse coastal reefs (Ferreira and Maida 2006).

Guilds have been extensively used to simplify the understanding of how aquatic environments function and their structure (Elliott et al. 2007a; Passos et al. 2013a; Passarone et al. 2019). According to our results, most of species were marine stragglers and migrants emphasizing the high tolerance that these fishes have, being able to endure wide salinity and depth variations (Franco et al. 2008; Passos et al. 2013a; Camara et al. 2020). Species that are more dependent on estuarine areas are more likely to resist high ranges of environmental characteristics having a vast distribution when compared with other groups (e.g., freshwater that are more confined to areas with riverine input) (Reis et al. 2016; Camara et al. 2020).

Estuaries tend to have a diverse number of trophic levels, as observed in the present study, but zoobenthivorous and piscivorous species prevailed among them, as previously reported by Blaber (2000). This may be explained by the prevalence of rich nutrients in the sediment along with the high primary production carried through the organic material transport from adjacent rivers to the ocean (Medeiros 2013b; Mourão et al. 2014b; Affe et al. 2021), that gives support to the estuarine trophic levels boosting the energy quantity to higher trophic levels (Yee et al. 2007; Medeiros 2013b).

The fish community was divided into twelve clusters with two larger ones separating the state of Rio Grande do Norte into one group and the states of Maranhão, Ceará, Paraíba, Pernambuco and Bahia into another one. This separation may be due to numerous reasons, the main one being the lack of available data for many of the studied estuaries or to low sampling effort which can underestimate the number of species in

some cases. Some states have accessible information for only one or two estuaries as those in the state of Alagoas and may even be restricted to one reference in some cases having a low sample size like the state of Piauí. This situation evidences the importance of compiling 'grey literature' data since a lack of information, not only in a wider but also local gradient, was shown in the present study.

The majority of species reported in the studied estuaries was categorized as Least Concern according to the IUCN and ICMbio conservation status. However, some of the species with important commercial value in the region were classified in some level of threat or as near threat. These species must be observed more carefully, especially *E. itajara*, currently with forbidden catches and commercialization (PEREIRA 2018). Also, attention is needed to species classified as NT and DD because it leads to an inhibition of a full grasp of their extinction risk.

The ecological importance of estuaries is indisputable, however, there is still a shortage of knowledge on their fish species composition knowledge on a larger scale, what might lead to an underestimation of their biodiversity (Barletta et al. 2010; Rotundo et al. 2020). The existing and available material literature presented in this study indicated a weakness of scientific studies on estuarine fishes for some of the states of Northeast Brazil, along with insufficient studies aiming at the compilation of these types of data. Our results contribute not only to an effective integration of different information on fish data, but also for providing a wider view on fish diversity in the Northeast estuaries of Brazil. It is evident, however, that in some estuaries, such those in Pernambuco, more information are available and abiotic data are easily found within grey literature. The opposite is observed in the estuaries in the state of Rio Grande do Norte for example. Henceforth, further research is still needed in taxonomic diversity and abiotic characterization of estuaries for better understanding the distribution patterns of coastal fish species and applying such knowledge on appropriate conservation policies.

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Author contributions

RSL and ASL performed the statistical analysis; RSL, ASL and LNE prepared the figures and tables; and RSL, LNE, ALS, FLF, TF and WS wrote the manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

All applicable international and national guidelines for the care and use of animals were followed by the authors.

Sampling and field studies

Permits for sampling field studies are not applicable.

Data availability

All data generated and related with this specific study are included in this article or supplementary information.

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Table I: List of fish species recorded in 45 estuaries in north-eastern Brazil, along with their conservation status (ICMbio and IUCN list). Estuaries: São Luís Island, Caranguejos Island, Parnaíba River, Timonha River, Barro dos Remédios, Coreaú, Guriú, Acaraú and Torrões. ICMbio and IUCN classification: endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

Species	São Luís Island-MA	Caranguejos Island-MA	Parnaíba River-PI	Timonha River-CE	Barra dos remédios-CE	Coreaú-CE	Guriú-CE	Acaraú-CE	Torrões-CE	IUCN	ICMBIO
ORECTOLOBIFORMES											
Ginglymostomatidae											
Ginglymostoma cirratum (Bonnaterre, 1788)	x									VU	VU
CARCHARHINIFORMES											
Carcharhinidae											
Carcharhinus leucas (Muller & Henle, 1839)				x		x		x		NT	NT
Carcharhinus limbatus (Muller & Henle, 1839)										NT	NT
Carcharhinus porosus (Ranzani, 1839)	x									CR	CR
Isogomphodon oxyrhynchus (Muller & Henle, 1839)	x									CR	CR
Rhizoprionodon lalandii (Muller & Henle, 1839)	x									VU	NT
Rhizoprionodon porosus (Poey, 1861)	x									VU	DD
Sphyrnidae											
Sphyrna lewini (Griffith & Smith, 1834)	x									CR	CR
Sphyrna tiburo (Linnaeus, 1758)	x									EN	CR
Sphyrna tudes (Valenciennes, 1822)	x									CR	CR
TORPEDINIFORMES											
Narcinidae											
Narcine brasiliensis (Olfers, 1831)	x									NT	DD
PRISTIFORMES											
Pristidae											
Pristis pristis Muller & Henle, 1841	x									CR	CR

	Rhinobatidae										
	Pseudobatos percellens (Walbaum, 1792)			x						EN	DD
MYLIOBATIFORMES											
	Dasyatidae										
	Fontitrygon geijskesi (Boeseman, 1948)	x								CR	DD
	Hypanus americanus (Hildebrand & Schroeder, 1928)									NT	DD
	Hypanus guttatus (Bloch & Schneider, 1801)	x		x	x	x	x	x	x	NT	LC
	Hypanus marianae (Gomes, Rosa & Gadig, 2000)									EN	DD
	Hypanus say (Lesueur, 1817)									NT	DD
	Gymnuridae										
	Gymnura micrura (Bloch & Scheneider, 1801)	x		x		x				NT	NT
	Myliobatidae										
	Aetobatus narinari (Euphrasen, 1790)									EN	DD
	Mobula hypostoma (Bancroft, 1831)									EN	VU
	Rhinoptera bonasus (Mitchill, 1815)									VU	DD
ELOPIFORMES											
	Elopidae										
	Elops saurus Linnaeus, 1766	x	x	x	x	x	x	x	x	LC	NE
	Megalopidae										
	Megalops atlanticus Valenciennes, 1847	x		x		x		x		VU	VU
ALBULIFORMES											
	Albulidae										
	Albula vulpes (Linnaeus, 1758)	x		x	x	x	x	x	x	NT	DD
ANGUILLIFORMES											
	Muraenidae										
	Gymnothorax funebris Ranzani, 1839	x								LC	DD
	Gymnothorax moringa (Cuvier, 1829)									LC	DD
	Gymnothorax ocellatus Agassiz, 1831									LC	DD

	Gymnothorax vicinus (Castelnau, 1855)										LC	DD
	Ophichthidae											
	Ahlia egmontis (Jordan, 1884)										LC	LC
	Myrichthys breviceps (Richardson, 1848)										LC	LC
	Myrichthys ocellatus (Lesueur, 1825)				x						LC	LC
	Myrophis punctatus Lütken, 1852										LC	LC
	Ophichthus cylindroideus (Ranzani, 1839)	x									LC	LC
	Ophichthus ophis (Linnaeus, 1758)										LC	LC
	Muraenesocidae											
	Cynoponticus savanna (Bancroft, 1831)										LC	LC
	Congridae											
	Ariosoma balearicum (Delaroche, 1809)										LC	LC
CLUPEIFORMES												
	Pristigasteridae											
	Chirocentrodon bleekerianus (Poey, 1867)				x	x	x	x	x	x	LC	LC
	Odontognathus mucronatus Lacepède, 1800										LC	LC
	Pellona flavipinnis (Valenciennes,1837)	x									LC	LC
	Pellona harroweri (Fowler, 1917)										LC	LC
	Engraulidae											
	Anchoa filifera (Fowler, 1915)										LC	LC
	Anchoa hepsetus (Linnaeus, 1758)				x	x	x	x	x	x	LC	NE
	Anchoa januaria (Steindachner, 1879)										LC	LC
	Anchoa lyolepis (Evermann & Marsh, 1900)										LC	LC
	Anchoa parva (Meek & Hildebrand, 1923)										LC	NE
	Anchoa spinifer (Valenciennes, 1848)	x	x		x	x	x	x	x	x	LC	LC
	Anchoa tricolor (Spix & Agassiz, 1829)										LC	LC
	Anchovia clupeoides (Swainson, 1839)	x		x	x	x	x	x	x	x	LC	LC
	Anchoviella lepidentostole (Fowler, 1911)										LC	LC

	Cetengraulis edentulus (Cuvier, 1829)	x	x							LC	LC
	Engraulis anchoita Hubbs & Marini 1935									LC	LC
	Lycengraulis batesii (Gunther, 1868)			x	x	x	x	x	x	LC	LC
	Lycengraulis grossidens (Spix & Agassiz, 1829)	x			x	x	x	x	x	LC	LC
	Pterengraulis atherinoides (Linnaeus, 1766)	x		x						LC	LC
	Clupeidae										
	Harengula clupeola (Cuvier, 1829)									LC	LC
	Harengula jaguana Poey, 1865									LC	LC
	Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)	x								LC	LC
	Opisthonema oglinum (Lesueur, 1818)	x		x	x	x	x	x	x	LC	LC
	Platanichthys platana (Regan, 1917)									LC	LC
	Rhinosardinia amazonica (Steindachner, 1879)	x								LC	LC
	Rhinosardinia bahiensis (Steindachner, 1879)									LC	LC
CHARACIFORMES											
	Erythrinidae										
	Hoplias malabaricus (Bloch, 1794)			x	x		x		x	LC	LC
	Prochilodus argenteus Spix & Agassiz, 1829									NE	LC
	Serrasalmidae										
	Pygocentrus nattereri Kner, 1858	x								NE	LC
	Serrasalmus rhombeus (Linnaeus, 1766)			x						NE	LC
	Serrasalmus spilopleura Kner, 1858									NE	LC
	Anostomidae										
	Schizodon fasciatus Spix & Agassiz, 1829									NE	LC
	Leporinus friderici (Bloch, 1794)									NE	LC
	Curimatidae										
	Steindachnerina elegans (Steindachner, 1875)									NE	LC
	Characidae										
	Astyanax bimaculatus (Linnaeus, 1758)									NE	LC

Hemigrammus marginatus Ellis, 1911							NE	LC
SILURIFORMES								
Loricariidae								
Hypostomus plecostomus (Linnaeus, 1758)							NE	NE
Loricaria parnahybae Steindachner, 1907							NE	LC
Ariidae								
Aspistor luniscutis (Valenciennes, 1840)			x				NE	LC
Aspistor quadriscutis (Valenciennes, 1840)	x						LC	LC
Bagre bagre (Linnaeus, 1766)	x	x	x				LC	NT
Bagre marinus (Mitchill, 1815)							LC	DD
Cathorops agassizii (Eigenmann & Eigenmann, 1888)		x					NE	LC
Cathorops spixii (Agassiz, 1829)	x	x	x	x	x	x	NE	LC
Genidens genidens (Cuvier, 1829)							LC	LC
Notarius grandicassis (Valenciennes, 1840)	x						LC	LC
Sciades couma (Valenciennes, 1840)	x						LC	DD
Sciades herzbergii (Bloch, 1794)	x	x	x			x	LC	LC
Sciades parkeri (Traill, 1832)	x						VU	VU
Sciades proops (Valenciennes, 1840)	x	x					NE	DD
Aspredinidae								
Aspredo aspredo (Linnaeus, 1758)	x		x				LC	LC
Aspredinichthys tibicen (Valenciennes, 1840)	x	x					LC	LC
Auchenipteridae								
Ageneiosus inermis (Linnaeus, 1766)			x				NE	LC
Pseudauchenipterus nodosus (Bloch, 1794)	x	x	x				NE	LC
Trachelyopterus galeatus (Linnaeus, 1766)							NE	LC
Heptapteridae								
Pimelodella cristata (Muller & Troschel, 1849)							LC	LC
Pimelodella lateristriga (Lichtenstein, 1823)							NE	DD

Pimelodidae											
Brachyplatystoma vaillantii (Valenciennes, 1840)			x							NE	LC
Pseudoplatystoma fasciatum (Linnaeus, 1766)			x							NE	NE
Sorubim lima (Bloch & Schneider, 1801)			x							NE	LC
AULOPIFORMES											
Synodontidae											
Synodus foetens (Linnaeus, 1766)	x			x	x		x			LC	LC
Synodus poeyi Jordan, 1887										LC	LC
Trachinocephalus myops (Forster, 1801)										LC	LC
HOLOCENTRIFORMES											
Holocentridae											
Holocentrus adscensionis (Osbeck, 1765)										LC	LC
BATRACHOIDIFORMES											
Batrachoididae											
Amphichthys cryptocentrus (Valenciennes, 1837)										LC	LC
Batrachoides surinamensis (Bloch & Schneider, 1801)	x	x	x	x	x	x	x	x	x	LC	LC
Thalassophryne nattereri Steindachner, 1876	x			x	x	x	x	x	x	LC	LC
Thalassophryne punctata Steindachner, 1876										NE	LC
KURTIFORMES											
Apogonidae											
Phaeoptyx pigmentaria (Poey, 1860)										LC	LC
GOBIIFORMES											
Eleotridae											
Dormitator maculatus (Bloch, 1792)				x	x	x	x	x	x	LC	NT
Eleotris pisonis (Gmelin, 1789)										LC	LC
Erotelis smaragdus (Valenciennes, 1837)										LC	LC
Guavina guavina (Valenciennes, 1837)	x									LC	LC
Gobiidae											

	Awaous tajasica (Lichtenstein, 1822)									LC	LC
	Bathygobius mystacium Ginsburg, 1947									LC	NE
	Bathygobius soporator (Valenciennes, 1837)	x		x	x		x		x	LC	LC
	Coryphopterus glaucofraenum Gill, 1863									LC	LC
	Ctenogobius boleosoma (Jordan & Gilbert, 1882)									LC	LC
	Ctenogobius saepepallens (Gilbert & Randall, 1968)									LC	LC
	Ctenogobius shufeldti (Jordan & Eigenmann, 1887)	x								LC	LC
	Ctenogobius smaragdus (Valenciennes, 1837)									LC	LC
	Ctenogobius stigmaticus (Poey, 1860)									LC	LC
	Evorthodus lyricus (Girard, 1858)						x		x	LC	LC
	Gobioides broussonnetii Lacepède, 1800									LC	LC
	Gobionellus oceanicus (Pallas, 1770)	x					x		x	LC	LC
	Gobionellus stomatus Starks, 1913					x				NE	LC
	Microdesmus bahianus Dawson, 1973									LC	LC
	Microdesmus longipinnis (Weymouth, 1910)									LC	LC
	Microgobius meeki Evermann & Marsh, 1899									LC	LC
	Pomacentridae										
	Abudefduf saxatilis (Linnaeus, 1758)									LC	LC
	Stegastes fuscus (Cuvier, 1830)									LC	LC
	Stegastes variabilis (Castelnau, 1855)									NE	LC
	Opistognathidae										
	Opistognathus cuvierii Valenciennes, 1836									NE	LC
MUGILIFORMES											
	Mugilidae										
	Mugil brevirostris (Ribeiro, 1915)									NE	NE
	Mugil curema Valenciennes, 1836	x	x	x	x	x	x	x	x	x	LC	DD
	Mugil curvidens Valenciennes, 1836	x			x	x	x	x	x	x	LC	DD
	Mugil incilis Hancock, 1830	x	x		x	x	x	x	x	x	LC	LC

Mugil liza Valenciennes, 1836	x		x	x	x	x	x	x	DD	NT
Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007									LC	DD
CICHLIFORMES										
Cichlidae										
Cichla ocellaris Bloch & Schneider, 1801			x		x				NE	LC
Oreochromis niloticus (Linnaeus, 1758)			x		x		x		LC	NE
BLENNIIFORMES										
Dactyloscopidae										
Dactyloscopus crossotus Starks, 1913									LC	LC
Blenniidae										
Scartella cristata (Linnaeus, 1758)									LC	LC
Labrisomidae										
Labrisomus nuchipinnis (Quoy & Gaimard, 1824)									LC	LC
ATHERINIFORMES										
Atherinidae										
Atherinella brasiliensis (Quoy & Gaimard, 1825)	x		x	x	x	x	x	x	LC	LC
Atherinella cf. blackburni (Schultz, 1949)									LC	LC
Odontesthes bonariensis (Valenciennes, 1835)									NE	DD
BELONIFORMES										
Exocoetidae										
Cheilopogon melanurus (Valenciennes, 1847)	x								LC	LC
Hirundichthys affinis (Gunther, 1866)									LC	LC
Hemiramphidae										
Hemiramphus balao Lesueur, 1821									LC	DD
Hemiramphus brasiliensis (Linnaeus, 1758)									LC	LC
Hyporhamphus roberti roberti (Valenciennes, 1847)									LC	LC
Hyporhamphus unifasciatus (Ranzani, 1841)								x	LC	NT
Belonidae										

Ablennes hians (Valenciennes, 1846)										LC	LC
Strongylura marina (Walbaum, 1792)	x	x		x	x		x		x	LC	LC
Strongylura timucu (Walbaum, 1792)	x				x	x		x		LC	LC
Tylosurus acus acus (Lacepède, 1803)										LC	LC
Tylosurus crocodilus crocodilus (Péron & Lesueur, 1821)										LC	LC
CYPRINODONTIFORMES											
Poeciliidae											
Poecilia vivipara Bloch & Schneider, 1801										NE	LC
CARANGIFORMES											
Rachycentridae											
Rachycentron canadum (Linnaeus, 1766)										LC	LC
Echeneidae											
Echeneis naucrates Linnaeus, 1758	x			x		x		x		LC	LC
Phtheirichthys lineatus (Menzies, 1791)										LC	LC
Remora remora (Linnaeus, 1758)										LC	LC
Carangidae											
Carangoides bartholomaei (Cuvier, 1833)										LC	LC
Caranx crysos (Mitchill, 1815)	x					x		x		LC	LC
Caranx hippos (Linnaeus, 1766)	x		x	x	x	x	x	x	x	LC	LC
Caranx latus Agassiz, 1831	x		x	x	x	x	x	x	x	LC	LC
Chloroscombrus chrysurus (Linnaeus, 1766)	x		x	x	x	x	x	x	x	LC	LC
Hemicaranx amblyrhynchus (Cuvier, 1833)	x									LC	LC
Oligoplites palometa (Cuvier, 1832)	x		x	x	x	x	x	x	x	LC	LC
Oligoplites saliens (Bloch, 1793)			x	x	x	x	x	x	x	LC	LC
Oligoplites saurus (Bloch & Schneider, 1801)	x	x		x	x	x	x	x	x	LC	LC
Selene brownii (Curvier, 1816)										LC	LC
Selene setapinnis (Mitchill, 1815)				x		x				LC	LC
Selene vomer (Linnaeus, 1758)	x		x	x	x	x		x		LC	LC

Trachinotus carolinus (Linnaeus, 1766)	x									LC	LC
Trachinotus cayennensis Cuvier, 1832	x									LC	DD
Trachinotus falcatus (Linnaeus, 1758)	x			x	x	x	x	x	x	LC	LC
Trachinotus goodei Jordan & Evermann, 1896			x	x	x	x	x	x	x	LC	LC
ISTIOPHORIFORMES											
Sphyraenidae											
Sphyraena barracuda (Edwards, 1771)				x		x				LC	LC
Sphyraena guachancho Cuvier, 1829										LC	LC
PLEURONECTIFORMES											
Paralichthyidae											
Citharichthys arenaceus Evermann & Marsh, 1900										LC	LC
Citharichthys cornutus (Günther, 1880)										LC	LC
Citharichthys macrops Dresel, 1885										LC	LC
Citharichthys spilopterus Günther, 1862	x		x	x				x	x	LC	LC
Etropus crossotus Jordan & Gilbert, 1882	x			x				x	x	LC	LC
Etropus longimanus Norman, 1933										NE	LC
Paralichthys brasiliensis (Ranzani, 1842)		x								NE	LC
Paralichthys orbignyanus (Valenciennes, 1839)										DD	DD
Paralichthys tropicus Ginsburg, 1933										DD	NE
Syacium micrurum Ranzani, 1842										LC	LC
Syacium papillosum (Linnaeus, 1758)										LC	LC
Bothidae											
Bothus lunatus (Linnaeus, 1758)										LC	LC
Bothus ocellatus (Agassiz, 1831)										LC	LC
Bothus robinsi Topp & Hoff, 1972										LC	LC
Achiridae											
Achirus achirus (Linnaeus, 1758)	x	x	x	x				x		LC	LC
Achirus declivis Chabanaud, 1940			x	x	x	x				LC	LC

	Achirus lineatus (Linnaeus, 1758)		x	x	x			x	LC	LC
	Achirus mucuri Ramos, Ramos & Lopes, 2009								NE	VU
	Trinectes microphthalmus (Chabanaud, 1928)								LC	LC
	Trinectes paulistanus (Miranda Ribeiro, 1915)	x			x	x			LC	LC
	Cynoglossidae									
	Symphurus diomedeanus (Goode & Bean, 1885)								LC	LC
	Symphurus plagusia (Bloch & Schneider, 1801)	x							LC	LC
	Symphurus tessellatus (Quoy & Gaimard, 1824)								LC	LC
SYNGNATHIFORMES										
	Syngnathidae									
	Bryx dunckeri (Metzelaar, 1919)								LC	LC
	Cosmocampus elucens (Poey, 1868)								LC	LC
	Hippocampus erectus Perry, 1810								VU	VU
	Hippocampus reidi Ginsburg, 1933		x		x	x	x	x	NT	VU
	Microphis brachyurus lineatus (Kaup, 1856)								NE	NE
	Microphis brachyurus brachyurus (Bleeker, 1854)								LC	LC
	Fistulariidae									
	Fistularia petimba Lacepède, 1803								LC	LC
	Fistularia tabacaria Linnaeus, 1758								LC	LC
	Syngnathus pelagicus Linnaeus, 1758								LC	LC
	Dactylopteridae									
	Dactylopterus volitans (Linnaeus, 1758)								LC	LC
SCOMBRIFORMES										
	Trichiuridae									
	Trichiurus lepturus Linnaeus, 1758	x	x	x	x	x	x		LC	LC
	Scombridae									
	Euthynnus alletteratus (Rafinesque, 1810)								LC	LC

	Scomberomorus brasiliensis Collette, Russo & Zavala-Camin, 1978				x					LC	LC
	Scomberomorus cavalla (Cuvier, 1829)									LC	LC
	Scomberomorus maculatus (Mitchill, 1815)									LC	NE
	Scomberomorus regalis (Bloch, 1793)									LC	LC
	Stromateidae										
	Peprilus paru (Linnaeus, 1758)	x			x		x		x	LC	LC
TRACHINIFORMES											
	Uranoscopidae										
	Astroscopus y-graecum Cuvier, 1829									LC	LC
LABRIFORMES											
	Labridae										
	Halichoeres poeyi (Steindachner, 1867)									LC	LC
	Scaridae										
	Nicholsina usta (Valenciennes, 1840)									LC	LC
	Sparisoma amplum (Ranzani, 1842)									LC	NT
	Sparisoma axillare (Steindachner, 1878)									DD	VU
	Sparisoma radians (Valenciennes, 1840)									LC	LC
PERCIFORMES											
	Centropomidae										
	Centropomus ensiferus Poey, 1860				x	x	x	x	x	x	LC	LC
	Centropomus mexicanus Bocourt, 1868										LC	LC
	Centropomus parallelus Poey, 1860	x	x	x	x	x	x	x	x	x	LC	LC
	Centropomus pectinatus Poey, 1860										LC	LC
	Centropomus undecimalis (Bloch, 1792)	x		x	x	x	x	x	x	x	LC	LC
	Gerreidae											
	Diapterus auratus Ranzani, 1842	x		x	x	x	x	x	x	x	LC	LC
	Diapterus rhombeus (Cuvier, 1829)	x	x	x	x		x		x		LC	LC

Eucinostomus argenteus Baird & Girard, 1855	x					x				LC	LC
Eucinostomus gula (Quoy & Gaimard, 1824)	x									LC	LC
Eucinostomus havana (Nichols, 1912)										LC	LC
Eucinostomus melanopterus (Bleeker, 1863)	x			x	x	x	x	x	x	LC	LC
Eugerres brasilianus (Cuvier, 1830)	x			x				x		LC	LC
Gerres cinereus (Walbaum, 1792)				x	x	x	x	x	x	LC	LC
Ulaema lefroyi (Goode, 1874)										LC	LC
Mullidae											
Pseudupeneus maculatus (Bloch, 1793)										LC	LC
Serranidae											
Alphestes afer (Bloch, 1793)										LC	DD
Diplectrum radiale (Quoy & Gaimard, 1824)	x			x	x					LC	LC
Epinephelus adscensionis (Osbeck, 1765)										LC	DD
Epinephelus itajara (Lichtenstein, 1822)	x			x		x				VU	CR
Hyporthodus nigritus (Holbrook, 1855)										NT	EN
Mycteroperca bonaci (Poey, 1860)	x			x	x	x	x	x	x	NT	VU
Mycteroperca tigris (Valenciennes, 1833)										DD	DD
Mycteroperca venenosa (Linnaeus, 1758)										NT	DD
Rypticus randalli Courtenay, 1967	x		x	x	x	x	x	x	x	LC	LC
Rypticus saponaceus (Bloch & Schneider, 1801)										LC	LC
Serranus flaviventris (Cuvier, 1829)										LC	LC
Serranus phoebe Poey, 1851										LC	LC
Pomacanthidae											
Pomacanthus arcuatus (Linnaeus, 1758)										LC	DD
Pomacanthus paru (Bloch, 1787)	x									LC	DD
Chaetodontidae											
Chaetodon ocellatus (Bloch, 1787)										LC	DD
Chaetodon striatus Linnaeus, 1758										LC	LC

Haemulidae											
Anisotremus surinamensis (Bloch, 1791)				x				x		DD	DD
Anisotremus virginicus (Linnaeus, 1758)				x	x	x	x	x	x	LC	LC
Conodon nobilis (Linnaeus, 1758)	x		x	x			x			LC	LC
Genyatremus luteus (Bloch, 1790)	x	x	x	x	x	x	x	x	x	NE	LC
Haemulon aurolineatum Cuvier, 1830										LC	LC
Haemulon parra (Desmarest, 1823)								x		LC	LC
Haemulon plumierii (Lacepède, 1801)										LC	DD
Haemulon squamipinna Rocha & Rosa, 1999										NE	LC
Haemulon steindachneri (Jordan & Gilbert, 1882)										LC	LC
Orthopristis ruber (Cuvier, 1830)	x									LC	LC
Pomadasys corvinaeformis (Steindachner, 1868)	x			x	x	x	x	x	x	LC	LC
Pomadasys crocro (Cuvier, 1830)										DD	LC
Pomadasys ramosus Poey, 1860										NE	LC
Lutjanidae											
Lutjanus alexandrei Moura & Linderman, 2007										NE	LC
Lutjanus analis (Cuvier, 1828)				x	x	x	x	x		NT	NT
Lutjanus apodus (Walbaum, 1792)				x	x	x	x	x	x	LC	NE
Lutjanus cyanopterus (Cuvier, 1828)										VU	VU
Lutjanus griseus (Linnaeus, 1758)				x				x		LC	NE
Lutjanus jocu (Bloch & Schneider, 1801)	x		x	x	x	x	x	x	x	DD	NT
Lutjanus synagris (Linnaeus, 1758)	x			x	x	x	x	x		NT	NT
Ocyurus chrysurus (Bloch, 1791)										DD	NT
Polynemidae											
Polydactylus oligodon (Gunther, 1860)	x									LC	LC
Polydactylus virginicus (Linnaeus, 1758)	x		x							LC	LC
SCORPAENIFORMES											
Scorpaenidae											

Scorpaena isthmensis Meek & Hilderbrand, 1928										LC	LC
Scorpaena plumieri Bloch, 1789	x									LC	LC
Triglidae											
Prionotus punctatus (Bloch, 1793)										LC	LC
MORONIFORMES											
Ephippidae											
Chaetodipterus faber (Broussonet, 1782)	x	x		x	x	x	x	x	x	LC	LC
ACANTHURIFORMES											
Sciaenidae											
Bairdiella ronchus (Cuvier, 1830)	x	x	x	x	x	x	x	x	x	LC	LC
Cynoscion acoupa (Lacepède, 1801)	x	x	x	x	x	x	x	x	x	LC	NT
Cynoscion jamaicensis (Vaillant & Bocourt, 1833)										LC	LC
Cynoscion leiarchus (Cuvier, 1830)	x	x	x	x	x	x	x	x	x	LC	LC
Cynoscion microlepidotus (Cuvier, 1830)	x		x	x	x	x	x	x	x	LC	LC
Cynoscion steindachneri (Jordan, 1889)	x	x								LC	LC
Cynoscion virescens (Cuvier, 1830)			x					x		LC	LC
Isopisthus parvipinnis (Cuvier, 1830)	x		x							LC	LC
Larimus breviceps Cuvier, 1830										LC	LC
Macrodon ancylodon (Bloch & Schneider, 1801)	x	x	x							LC	LC
Menticirrhus americanus (Linnaeus, 1758)	x		x	x	x	x	x	x	x	LC	DD
Menticirrhus littoralis (Holbrook, 1847)				x	x	x	x	x	x	LC	DD
Micropogonias furnieri (Desmarest, 1823)	x		x	x	x	x	x	x	x	LC	LC
Nebris microps Cuvier, 1830	x		x							LC	LC
Odontoscion dentex (Cuvier, 1830)										LC	LC
Ophioscion punctatissimus Meek & Hildebrand, 1925	x					x		x		LC	DD
Paralonchurus brasiliensis (Steindachner, 1875)										LC	LC
Pareques acuminatus (Bloch & Schneider, 1801)										LC	DD
Pogonias cromis (Linnaeus, 1766)										LC	EN

	Stellifer brasiliensis (Schultz, 1945)	x									NE	LC
	Stellifer microps (Steindachner, 1864)										LC	LC
	Stellifer naso (Jordan, 1889)	x	x								LC	LC
	Stellifer rastrifer (Jordan, 1889)	x	x	x							LC	LC
	Stellifer stellifer (Bloch, 1790)	x		x							DD	LC
	Umbrina coroides Cuvier, 1830										LC	LC
	Acanthuridae											
	Acanthurus bahianus Castelnau, 1855				x		x		x		LC	LC
	Acanthurus chirurgus (Bloch, 1787)										LC	LC
	Acanthurus coeruleus Bloch & Schneider, 1801				x		x		x		LC	LC
SPARIFORMES												
	Lobotidae											
	Lobotes surinamensis (Bloch, 1790)	x			x	x	x	x	x	x	LC	LC
	Sparidae											
	Archosargus probatocephalus (Walbaum, 1792)	x			x		x		x		LC	DD
	Archosargus rhomboidalis (Linnaeus, 1758)				x		x				LC	LC
LOPHIIFORMES												
	Antennariidae											
	Antennarius multiocellatus (Valenciennes, 1837)										LC	DD
	Antennarius striatus (Shaw, 1794)				x	x					LC	DD
	Ogcocephalidae											
	Ogcocephalus vespertilio (Linnaeus, 1758)	x			x	x	x	x	x	x	NE	LC
TETRAODONTIFORMES												
	Ostraciidae											
	Acanthostracion quadricornis (Linnaeus, 1758)										LC	LC
	Lactophrys trigonus (Linnaeus, 1758)										LC	LC
	Lactophrys triqueter (Linnaeus, 1758)										LC	NE
	Balistidae											

Balistes vetula Linnaeus, 1758										NT	NT
Melichthys niger (Bloch, 1786)										LC	LC
Monacanthidae											
Aluterus heudelotii Hollard, 1855										LC	LC
Aluterus monoceros (Linnaeus, 1758)	x									LC	NT
Aluterus schoepfii (Walbaum, 1792)										LC	LC
Cantherhines pullus (Ranzani, 1842)										LC	LC
Monacanthus ciliatus (Mitchill, 1818)										LC	LC
Stephanolepis hispidus (Linnaeus, 1766)										LC	LC
Stephanolepis setifer (Bennett, 1831)										LC	LC
Tetraodontidae											
Canthigaster figueiredoi Moura & Castro, 2002										LC	LC
Colomesus psittacus (Bloch & Schneider, 1801)	x	x	x	x	x	x	x	x	x	LC	LC
Lagocephalus laevigatus (Linnaeus, 1766)	x			x	x			x		LC	LC
Sphoeroides greeleyi Gilbert, 1900	x									LC	LC
Sphoeroides nephelus (Goode & Bean, 1882)										LC	NE
Sphoeroides spengleri (Bloch, 1785)										LC	LC
Sphoeroides testudineus (Linnaeus, 1758)	x		x	x	x	x	x	x	x	LC	DD
Sphoeroides tyleri Shipp, 1972										LC	LC
Diodontidae											
Chilomycterus antillarum Jordan & Rutter, 1897	x									LC	LC
Chilomycterus spinosus spinosus (Linnaeus, 1758)				x			x			LC	LC
Diodon holocanthus Linnaeus, 1758										LC	LC
Diodon hystrix Linnaeus, 1758										LC	LC

Table II: List of fish species recorded in 45 estuaries in north-eastern Brazil, along with their conservation status (ICMbio and IUCN list). Estuaries: Aracatiaçu, Mundaú River- CE, Curu River, Cocó River, Pacoti River, Pirangi River, Jaguaribe River – CE, Grossos and Areia Branca. ICMbio and IUCN classification: endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

Species	Aracatiaçu-CE	Mundaú River-CE	Curu River-CE	Cocó River-CE	Pacoti River-CE	Pirangi River-CE	Jaguaribe River-CE	Grossos-RN	Areia Branca-RN	IUCN	ICMBIO
ORECTOLOBIFORMES											
Ginglymostomatidae											
Ginglymostoma cirratum (Bonnaterre, 1788)										VU	VU
CARCHARHINIFORMES											
Carcharhinidae											
Carcharhinus leucas (Muller & Henle, 1839)				x			x			NT	NT
Carcharhinus limbatus (Muller & Henle, 1839)			x							NT	NT
Carcharhinus porosus (Ranzani, 1839)										CR	CR
Isogomphodon oxyrhynchus (Muller & Henle, 1839)										CR	CR
Rhizoprionodon lalandii (Muller & Henle, 1839)										VU	NT
Rhizoprionodon porosus (Poey, 1861)			x							VU	DD
Sphyrnidae											
Sphyrna lewini (Griffith & Smith, 1834)										CR	CR
Sphyrna tiburo (Linnaeus, 1758)							x			EN	CR
Sphyrna tudes (Valenciennes, 1822)										CR	CR
TORPEDINIFORMES											
Narcinidae											
Narcine brasiliensis (Olfers, 1831)									x	NT	DD
PRISTIFORMES											
Pristidae											
Pristis pristis Muller & Henle, 1841										CR	CR
Rhinobatidae											

Pseudobatos percellens (Walbaum, 1792)										EN	DD
MYLIOBATIFORMES											
Dasyatidae											
Fontitrygon geijskesi (Boeseman, 1948)										CR	DD
Hypanus americanus (Hildebrand & Schroeder, 1928)										NT	DD
Hypanus guttatus (Bloch & Schneider, 1801)	x	x	x	x	x	x	x			NT	LC
Hypanus marianae (Gomes, Rosa & Gadig, 2000)			x							EN	DD
Hypanus say (Lesueur, 1817)							x			NT	DD
Gymnuridae											
Gymnura micrura (Bloch & Scheneider, 1801)		x	x				x			NT	NT
Myliobatidae											
Aetobatus narinari (Euphrasen, 1790)			x							EN	DD
Mobula hypostoma (Bancroft, 1831)										EN	VU
Rhinoptera bonasus (Mitchill, 1815)										VU	DD
ELOPIFORMES											
Elopidae											
Elops saurus Linnaeus, 1766	x	x	x	x	x	x	x	x	x	LC	NE
Megalopidae											
Megalops atlanticus Valenciennes, 1847		x	x	x	x	x	x		x	VU	VU
ALBULIFORMES											
Albulidae											
Albula vulpes (Linnaeus, 1758)	x	x	x	x	x	x	x			NT	DD
ANGUILLIFORMES											
Muraenidae											
Gymnothorax funebris Ranzani, 1839										LC	DD
Gymnothorax moringa (Cuvier, 1829)										LC	DD
Gymnothorax ocellatus Agassiz, 1831										LC	DD
Gymnothorax vicinus (Castelnau, 1855)										LC	DD

	Ophichthidae											
	Ahlia egmontis (Jordan, 1884)										LC	LC
	Myrichthys breviceps (Richardson, 1848)										LC	LC
	Myrichthys ocellatus (Lesueur, 1825)		x	x						x	LC	LC
	Myrophis punctatus Lütken, 1852				x	x		x			LC	LC
	Ophichthus cylindroideus (Ranzani, 1839)										LC	LC
	Ophichthus ophis (Linnaeus, 1758)										LC	LC
	Muraenesocidae											
	Cynoponticus savanna (Bancroft, 1831)										LC	LC
	Congridae											
	Ariosoma balearicum (Delaroche, 1809)										LC	LC
CLUPEIFORMES												
	Pristigasteridae											
	Chirocentrodon bleekerianus (Poey, 1867)	x	x	x	x	x	x	x		x	LC	LC
	Odontognathus mucronatus Lacepède, 1800								x		LC	LC
	Pellona flavipinnis (Valenciennes,1837)										LC	LC
	Pellona harroweri (Fowler, 1917)								x		LC	LC
	Engraulidae											
	Anchoa filifera (Fowler, 1915)									x	LC	LC
	Anchoa hepsetus (Linnaeus, 1758)	x	x	x	x	x	x	x			LC	NE
	Anchoa januaria (Steindachner, 1879)										LC	LC
	Anchoa lyolepis (Evermann & Marsh, 1900)										LC	LC
	Anchoa parva (Meek & Hildebrand, 1923)										LC	NE
	Anchoa spinifer (Valenciennes, 1848)	x	x	x	x	x	x	x			LC	LC
	Anchoa tricolor (Spix & Agassiz, 1829)			x							LC	LC
	Anchovia clupeoides (Swainson, 1839)	x	x	x	x	x	x	x			LC	LC
	Anchoviella lepidentostole (Fowler, 1911)										LC	LC
	Cetengraulis edentulus (Cuvier, 1829)			x							LC	LC

	Engraulis anchoita Hubbs & Marini 1935									LC	LC
	Lycengraulis batesii (Gunther, 1868)	x	x	x	x	x	x	x		LC	LC
	Lycengraulis grossidens (Spix & Agassiz, 1829)	x	x	x	x	x	x	x	x	LC	LC
	Pterengraulis atherinoides (Linnaeus, 1766)									LC	LC
	Clupeidae										
	Harengula clupeola (Cuvier, 1829)			x						LC	LC
	Harengula jaguana Poey, 1865									LC	LC
	Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)								x	LC	LC
	Opisthonema oglinum (Lesueur, 1818)	x	x	x	x	x	x	x	x	LC	LC
	Platanichthys platana (Regan, 1917)							x		LC	LC
	Rhinosardinia amazonica (Steindachner, 1879)				x	x		x		LC	LC
	Rhinosardinia bahiensis (Steindachner, 1879)				x	x		x	x	LC	LC
CHARACIFORMES											
	Erythrinidae										
	Hoplias malabaricus (Bloch, 1794)			x	x	x	x	x		LC	LC
	Prochilodus argenteus Spix & Agassiz, 1829									NE	LC
	Serrasalmidae										
	Pygocentrus nattereri Kner, 1858							x		NE	LC
	Serrasalmus rhombeus (Linnaeus, 1766)							x		NE	LC
	Serrasalmus spilopleura Kner, 1858							x		NE	LC
	Anostomidae										
	Schizodon fasciatus Spix & Agassiz, 1829					x		x		NE	LC
	Leporinus friderici (Bloch, 1794)							x		NE	LC
	Curimatidae										
	Steindachnerina elegans (Steindachner, 1875)							x		NE	LC
	Characidae										
	Astyanax bimaculatus (Linnaeus, 1758)							x		NE	LC
	Hemigrammus marginatus Ellis, 1911							x		NE	LC

SILURIFORMES										
Loricariidae										
Hypostomus plecostomus (Linnaeus, 1758)					x			NE	NE	
Loricaria parnahybae Steindachner, 1907					x			NE	LC	
Ariidae										
Aspistor luniscutis (Valenciennes, 1840)								NE	LC	
Aspistor quadriscutis (Valenciennes, 1840)								LC	LC	
Bagre bagre (Linnaeus, 1766)								LC	NT	
Bagre marinus (Mitchill, 1815)					x	x	x	LC	DD	
Cathorops agassizii (Eigenmann & Eigenmann, 1888)								NE	LC	
Cathorops spixii (Agassiz, 1829)		x	x	x	x	x	x	NE	LC	
Genidens genidens (Cuvier, 1829)								LC	LC	
Notarius grandicassis (Valenciennes, 1840)								LC	LC	
Sciades couma (Valenciennes, 1840)								LC	DD	
Sciades herzbergii (Bloch, 1794)	x	x	x	x	x			LC	LC	
Sciades parkeri (Traill, 1832)								VU	VU	
Sciades proops (Valenciennes, 1840)					x			NE	DD	
Aspredinidae										
Aspredo aspredo (Linnaeus, 1758)								LC	LC	
Aspredinichthys tibicen (Valenciennes, 1840)								LC	LC	
Auchenipteridae										
Ageneiosus inermis (Linnaeus, 1766)								NE	LC	
Pseudauchenipterus nodosus (Bloch, 1794)								NE	LC	
Trachelyopterus galeatus (Linnaeus, 1766)		x			x			NE	LC	
Heptapteridae										
Pimelodella cristata (Muller & Troschel, 1849)					x			LC	LC	
Pimelodella lateristriga (Lichtenstein, 1823)					x			NE	DD	
Pimelodidae										

Brachyplatystoma vaillantii (Valenciennes, 1840)										NE	LC
Pseudoplatystoma fasciatum (Linnaeus, 1766)										NE	NE
Sorubim lima (Bloch & Schneider, 1801)										NE	LC
AULOPIFORMES											
Synodontidae											
Synodus foetens (Linnaeus, 1766)	x		x	x	x	x	x			LC	LC
Synodus poeyi Jordan, 1887										LC	LC
Trachinocephalus myops (Forster, 1801)										LC	LC
HOLOCENTRIFORMES											
Holocentridae											
Holocentrus adscensionis (Osbeck, 1765)										LC	LC
BATRACHOIDIFORMES											
Batrachoididae											
Amphichthys cryptocentrus (Valenciennes, 1837)									x	LC	LC
Batrachoides surinamensis (Bloch & Schneider, 1801)	x	x	x	x	x	x	x			LC	LC
Thalassophryne nattereri Steindachner, 1876	x	x	x	x	x	x	x		x	LC	LC
Thalassophryne punctata Steindachner, 1876										NE	LC
KURTIFORMES											
Apogonidae											
Phaeoptyx pigmentaria (Poey, 1860)										LC	LC
GOBIIFORMES											
Eleotridae											
Dormitator maculatus (Bloch, 1792)	x	x	x	x	x	x	x	x	x	LC	NT
Eleotris pisonis (Gmelin, 1789)							x			LC	LC
Erotelis smaragdus (Valenciennes, 1837)										LC	LC
Guavina guavina (Valenciennes, 1837)								x	x	LC	LC
Gobiidae											
Awaous tajasica (Lichtenstein, 1822)										LC	LC

	Bathygobius mystacium Ginsburg, 1947									LC	NE
	Bathygobius soporator (Valenciennes, 1837)		x	x	x	x	x	x	x	LC	LC
	Coryphopterus glaucofraenum Gill, 1863									LC	LC
	Ctenogobius boleosoma (Jordan & Gilbert, 1882)			x	x	x		x	x	x	LC	LC
	Ctenogobius saepepallens (Gilbert & Randall, 1968)									LC	LC
	Ctenogobius shufeldti (Jordan & Eigenmann, 1887)									LC	LC
	Ctenogobius smaragdus (Valenciennes, 1837)		x		x	x		x			LC	LC
	Ctenogobius stigmaticus (Poey, 1860)									LC	LC
	Evorthodus lyricus (Girard, 1858)				x	x		x			LC	LC
	Gobioides broussonnetii Lacepède, 1800	x	x		x	x	x	x			LC	LC
	Gobionellus oceanicus (Pallas, 1770)				x	x		x			LC	LC
	Gobionellus stomatus Starks, 1913			x	x	x		x			NE	LC
	Microdesmus bahianus Dawson, 1973										LC	LC
	Microdesmus longipinnis (Weymouth, 1910)										LC	LC
	Microgobius meeki Evermann & Marsh, 1899										LC	LC
	Pomacentridae											
	Abudefduf saxatilis (Linnaeus, 1758)								x	x	LC	LC
	Stegastes fuscus (Cuvier, 1830)								x	x	LC	LC
	Stegastes variabilis (Castelnau, 1855)								x	x	NE	LC
	Opistognathidae											
	Opistognathus cuvierii Valenciennes, 1836										NE	LC
MUGILIFORMES												
	Mugilidae											
	Mugil brevirostris (Ribeiro, 1915)										NE	NE
	Mugil curema Valenciennes, 1836	x	x	x	x	x	x	x	x	x	LC	DD
	Mugil curvidens Valenciennes, 1836	x	x	x	x	x	x	x			LC	DD
	Mugil incilis Hancock, 1830	x	x	x	x	x	x	x			LC	LC
	Mugil liza Valenciennes, 1836	x	x	x	x	x	x	x	x	x	DD	NT

Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007										LC	DD
CICHLIFORMES											
Cichlidae											
Cichla ocellaris Bloch & Schneider, 1801							x			NE	LC
Oreochromis niloticus (Linnaeus, 1758)			x	x	x	x	x			LC	NE
BLENNIIFORMES											
Dactyloscopidae											
Dactyloscopus crossotus Starks, 1913										LC	LC
Blenniidae											
Scartella cristata (Linnaeus, 1758)										LC	LC
Labrisomidae											
Labrisomus nuchipinnis (Quoy & Gaimard, 1824)										LC	LC
ATHERINIFORMES											
Atherinidae											
Atherinella brasiliensis (Quoy & Gaimard, 1825)	x	x	x	x	x	x	x	x	x	LC	LC
Atherinella cf. blackburni (Schultz, 1949)										LC	LC
Odontesthes bonariensis (Valenciennes, 1835)										NE	DD
BELONIFORMES											
Exocoetidae											
Cheilopogon melanurus (Valenciennes, 1847)										LC	LC
Hirundichthys affinis (Gunther, 1866)										LC	LC
Hemiramphidae											
Hemiramphus balao Lesueur, 1821						x	x	x		LC	DD
Hemiramphus brasiliensis (Linnaeus, 1758)										LC	LC
Hyporhamphus roberti roberti (Valenciennes, 1847)										LC	LC
Hyporhamphus unifasciatus (Ranzani, 1841)		x	x		x		x			LC	NT
Belonidae											
Ablennes hians (Valenciennes, 1846)								x	x	LC	LC

Strongylura marina (Walbaum, 1792)	x		x	x	x	x	x			LC	LC
Strongylura timucu (Walbaum, 1792)	x	x		x	x		x	x	x	LC	LC
Tylosurus acus acus (Lacepède, 1803)										LC	LC
Tylosurus crocodilus crocodilus (Péron & Lesueur, 1821)							x			LC	LC
CYPRINODONTIFORMES											
Poeciliidae											
Poecilia vivipara Bloch & Schneider, 1801								x		NE	LC
CARANGIFORMES											
Rachycentridae											
Rachycentron canadum (Linnaeus, 1766)										LC	LC
Echeneidae											
Echeneis naucrates Linnaeus, 1758			x				x			LC	LC
Phtheirichthys lineatus (Menzies, 1791)										LC	LC
Remora remora (Linnaeus, 1758)							x			LC	LC
Carangidae											
Carangoides bartholomaei (Cuvier, 1833)										LC	LC
Caranx crysos (Mitchill, 1815)							x			LC	LC
Caranx hippos (Linnaeus, 1766)	x	x	x	x	x	x	x			LC	LC
Caranx latus Agassiz, 1831	x	x	x	x	x	x	x			LC	LC
Chloroscombrus chrysurus (Linnaeus, 1766)	x	x	x	x	x	x	x			LC	LC
Hemicaranx amblyrhynchus (Cuvier, 1833)										LC	LC
Oligoplites palometa (Cuvier, 1832)	x	x	x	x	x	x	x			LC	LC
Oligoplites saliens (Bloch, 1793)	x	x	x	x	x	x	x			LC	LC
Oligoplites saurus (Bloch & Schneider, 1801)	x	x	x	x	x	x	x			LC	LC
Selene brownii (Curvier, 1816)										LC	LC
Selene setapinnis (Mitchill, 1815)					x		x		x	LC	LC
Selene vomer (Linnaeus, 1758)		x	x	x	x		x			LC	LC
Trachinotus carolinus (Linnaeus, 1766)			x				x			LC	LC

Trachinotus cayennensis Cuvier, 1832										LC	DD
Trachinotus falcatus (Linnaeus, 1758)	x	x	x	x	x	x	x			LC	LC
Trachinotus goodei Jordan & Evermann, 1896	x	x	x	x	x	x	x		x	LC	LC
ISTIOPHORIFORMES											
Sphyraenidae											
Sphyraena barracuda (Edwards, 1771)		x		x	x		x	x	x	LC	LC
Sphyraena guachancho Cuvier, 1829										LC	LC
PLEURONECTIFORMES											
Paralichthyidae											
Citharichthys arenaceus Evermann & Marsh, 1900										LC	LC
Citharichthys cornutus (Günther, 1880)										LC	LC
Citharichthys macrops Dresel, 1885										LC	LC
Citharichthys spilopterus Günther, 1862		x	x	x	x	x	x			LC	LC
Etropus crossotus Jordan & Gilbert, 1882	x		x	x	x	x	x			LC	LC
Etropus longimanus Norman, 1933										NE	LC
Paralichthys brasiliensis (Ranzani, 1842)							x			NE	LC
Paralichthys orbignyanus (Valenciennes, 1839)										DD	DD
Paralichthys tropicus Ginsburg, 1933										DD	NE
Syacium micrurum Ranzani, 1842				x	x		x			LC	LC
Syacium papillosum (Linnaeus, 1758)										LC	LC
Bothidae											
Bothus lunatus (Linnaeus, 1758)										LC	LC
Bothus ocellatus (Agassiz, 1831)								x	x	LC	LC
Bothus robinsi Topp & Hoff, 1972										LC	LC
Achiridae											
Achirus achirus (Linnaeus, 1758)			x	x	x		x			LC	LC
Achirus declivis Chabanaud, 1940	x	x	x	x	x	x	x			LC	LC
Achirus lineatus (Linnaeus, 1758)		x	x	x	x		x			LC	LC

Achirus mucuri Ramos, Ramos & Lopes, 2009									NE	VU
Trinectes microphthalmus (Chabanaud, 1928)									LC	LC
Trinectes paulistanus (Miranda Ribeiro, 1915)	x		x	x	x	x	x		LC	LC
Cynoglossidae										
Symphurus diomedeanus (Goode & Bean, 1885)									LC	LC
Symphurus plagusia (Bloch & Schneider, 1801)				x	x		x		LC	LC
Symphurus tessellatus (Quoy & Gaimard, 1824)			x						LC	LC
SYNGNATHIFORMES										
Syngnathidae										
Bryx dunckeri (Metzelaar, 1919)									LC	LC
Cosmocampus elucens (Poey, 1868)									LC	LC
Hippocampus erectus Perry, 1810									VU	VU
Hippocampus reidi Ginsburg, 1933			x	x	x	x	x	x	NT	VU
Microphis brachyurus lineatus (Kaup, 1856)							x		NE	NE
Microphis brachyurus brachyurus (Bleeker, 1854)				x	x		x		LC	LC
Fistulariidae										
Fistularia petimba Lacepède, 1803									LC	LC
Fistularia tabacaria Linnaeus, 1758									LC	LC
Syngnathus pelagicus Linnaeus, 1758				x	x		x		LC	LC
Dactylopteridae										
Dactylopterus volitans (Linnaeus, 1758)									LC	LC
SCOMBRIFORMES										
Trichiuridae										
Trichiurus lepturus Linnaeus, 1758		x		x	x		x		LC	LC
Scombridae										
Euthynnus alletteratus (Rafinesque, 1810)									LC	LC
Scomberomorus brasiliensis Collette, Russo & Zavala-Camin, 1978			x	x	x		x		LC	LC

	Scomberomorus cavalla (Cuvier, 1829)										LC	LC
	Scomberomorus maculatus (Mitchill, 1815)						x				LC	NE
	Scomberomorus regalis (Bloch, 1793)										LC	LC
	Stromateidae											
	Peprilus paru (Linnaeus, 1758)		x			x		x			LC	LC
TRACHINIFORMES												
	Uranoscopidae											
	Astroscopus y-graecum Cuvier, 1829										LC	LC
LABRIFORMES												
	Labridae											
	Halichoeres poeyi (Steindachner, 1867)										LC	LC
	Scaridae											
	Nicholsina usta (Valenciennes, 1840)										LC	LC
	Sparisoma amplum (Ranzani, 1842)										LC	NT
	Sparisoma axillare (Steindachner, 1878)										DD	VU
	Sparisoma radians (Valenciennes, 1840)								x		LC	LC
PERCIFORMES												
	Centropomidae											
	Centropomus ensiferus Poey, 1860	x	x	x	x	x	x	x			LC	LC
	Centropomus mexicanus Bocourt, 1868										LC	LC
	Centropomus parallelus Poey, 1860	x	x	x				x			LC	LC
	Centropomus pectinatus Poey, 1860			x							LC	LC
	Centropomus undecimalis (Bloch, 1792)	x	x	x	x	x	x	x		x	LC	LC
	Gerreidae											
	Diapterus auratus Ranzani, 1842	x	x	x	x	x	x	x			LC	LC
	Diapterus rhombeus (Cuvier, 1829)		x	x	x	x		x	x	x	LC	LC
	Eucinostomus argenteus Baird & Girard, 1855			x	x			x	x	x	LC	LC
	Eucinostomus gula (Quoy & Gaimard, 1824)			x	x	x		x			LC	LC

Eucinostomus havana (Nichols, 1912)				x	x		x			LC	LC
Eucinostomus melanopterus (Bleeker, 1863)	x	x	x	x	x	x	x	x	x	LC	LC
Eugerres brasilianus (Cuvier, 1830)		x	x	x	x	x	x			LC	LC
Gerres cinereus (Walbaum, 1792)	x	x	x	x	x	x	x			LC	LC
Ulaema lefroyi (Goode, 1874)										LC	LC
Mullidae											
Pseudupeneus maculatus (Bloch, 1793)								x	x	LC	LC
Serranidae											
Alphestes afer (Bloch, 1793)										LC	DD
Diplectrum radiale (Quoy & Gaimard, 1824)		x	x	x	x	x	x			LC	LC
Epinephelus adscensionis (Osbeck, 1765)										LC	DD
Epinephelus itajara (Lichtenstein, 1822)			x	x	x	x	x			VU	CR
Hyporthodus nigritus (Holbrook, 1855)										NT	EN
Mycteroperca bonaci (Poey, 1860)	x	x	x	x	x	x	x			NT	VU
Mycteroperca tigris (Valenciennes, 1833)										DD	DD
Mycteroperca venenosa (Linnaeus, 1758)										NT	DD
Rypticus randalli Courtenay, 1967	x	x	x	x	x	x	x			LC	LC
Rypticus saponaceus (Bloch & Schneider, 1801)										LC	LC
Serranus flaviventris (Cuvier, 1829)										LC	LC
Serranus phoebe Poey, 1851										LC	LC
Pomacanthidae											
Pomacanthus arcuatus (Linnaeus, 1758)										LC	DD
Pomacanthus paru (Bloch, 1787)								x	x	LC	DD
Chaetodontidae											
Chaetodon ocellatus (Bloch, 1787)										LC	DD
Chaetodon striatus Linnaeus, 1758										LC	LC
Haemulidae											
Anisotremus surinamensis (Bloch, 1791)										DD	DD

	Anisotremus virginicus (Linnaeus, 1758)	x	x	x	x	x	x	x	x	x	LC	LC
	Conodon nobilis (Linnaeus, 1758)		x								LC	LC
	Genyatremus luteus (Bloch, 1790)	x	x	x	x	x	x	x			NE	LC
	Haemulon aurolineatum Cuvier, 1830								x	x	LC	LC
	Haemulon parra (Desmarest, 1823)			x		x			x	x	LC	LC
	Haemulon plumierii (Lacepède, 1801)								x	x	LC	DD
	Haemulon squamipinna Rocha & Rosa, 1999										NE	LC
	Haemulon steindachneri (Jordan & Gilbert, 1882)								x	x	LC	LC
	Orthopristis ruber (Cuvier, 1830)								x	x	LC	LC
	Pomadasys corvinaeformis (Steindachner, 1868)	x	x	x	x	x	x	x	x	x	LC	LC
	Pomadasys crocro (Cuvier, 1830)										DD	LC
	Pomadasys ramosus Poey, 1860										NE	LC
	Lutjanidae											
	Lutjanus alexandrei Moura & Linderman, 2007			x		x					NE	LC
	Lutjanus analis (Cuvier, 1828)		x	x	x	x	x	x	x	x	NT	NT
	Lutjanus apodus (Walbaum, 1792)	x	x	x	x	x	x	x	x	x	LC	NE
	Lutjanus cyanopterus (Cuvier, 1828)					x			x	x	VU	VU
	Lutjanus griseus (Linnaeus, 1758)							x	x	x	LC	NE
	Lutjanus jocu (Bloch & Schneider, 1801)	x	x	x	x	x	x	x			DD	NT
	Lutjanus synagris (Linnaeus, 1758)			x		x	x	x	x	x	NT	NT
	Ocyurus chrysurus (Bloch, 1791)										DD	NT
	Polynemidae											
	Polydactylus oligodon (Gunther, 1860)										LC	LC
	Polydactylus virginicus (Linnaeus, 1758)				x	x		x	x	x	LC	LC
SCORPAENIFORMES												
	Scorpaenidae											
	Scorpaena isthmensis Meek & Hilderbrand, 1928										LC	LC
	Scorpaena plumieri Bloch, 1789				x	x		x			LC	LC

Triglidae											
Prionotus punctatus (Bloch, 1793)							x			LC	LC
MORONIFORMES											
Ephippidae											
Chaetodipterus faber (Broussonet, 1782)	x	x	x	x	x	x	x			LC	LC
ACANTHURIFORMES											
Sciaenidae											
Bairdiella ronchus (Cuvier, 1830)	x	x	x	x	x	x	x			LC	LC
Cynoscion acoupa (Lacepède, 1801)	x	x	x	x	x	x	x	x	x	LC	NT
Cynoscion jamaicensis (Vaillant & Bocourt, 1833)										LC	LC
Cynoscion leiarchus (Cuvier, 1830)	x	x	x	x	x	x	x		x	LC	LC
Cynoscion microlepidotus (Cuvier, 1830)	x	x	x	x	x	x	x			LC	LC
Cynoscion steindachneri (Jordan, 1889)										LC	LC
Cynoscion virescens (Cuvier, 1830)		x				x	x			LC	LC
Isopisthus parvipinnis (Cuvier, 1830)										LC	LC
Larimus breviceps Cuvier, 1830								x	x	LC	LC
Macrodon ancylodon (Bloch & Schneider, 1801)										LC	LC
Menticirrhus americanus (Linnaeus, 1758)	x	x	x	x	x	x	x	x	x	LC	DD
Menticirrhus littoralis (Holbrook, 1847)	x	x	x	x	x	x	x			LC	DD
Micropogonias furnieri (Desmarest, 1823)	x	x	x	x	x	x	x	x	x	LC	LC
Nebris microps Cuvier, 1830										LC	LC
Odontoscion dentex (Cuvier, 1830)										LC	LC
Ophioscion punctatissimus Meek & Hildebrand, 1925							x			LC	DD
Paralonchurus brasiliensis (Steindachner, 1875)								x	x	LC	LC
Pareques acuminatus (Bloch & Schneider, 1801)										LC	DD
Pogonias cromis (Linnaeus, 1766)										LC	EN
Stellifer brasiliensis (Schultz, 1945)										NE	LC
Stellifer microps (Steindachner, 1864)										LC	LC

	Stellifer naso (Jordan, 1889)									LC	LC
	Stellifer rastrifer (Jordan, 1889)			x			x			LC	LC
	Stellifer stellifer (Bloch, 1790)							x	x	DD	LC
	Umbrina coroides Cuvier, 1830						x			LC	LC
	Acanthuridae										
	Acanthurus bahianus Castelnau, 1855		x	x	x	x	x			LC	LC
	Acanthurus chirurgus (Bloch, 1787)					x		x	x	LC	LC
	Acanthurus coeruleus Bloch & Schneider, 1801		x	x	x	x	x	x	x	LC	LC
SPARIFORMES											
	Lobotidae										
	Lobotes surinamensis (Bloch, 1790)	x	x	x	x	x	x	x		LC	LC
	Sparidae										
	Archosargus probatocephalus (Walbaum, 1792)		x	x	x	x	x	x		LC	DD
	Archosargus rhomboidalis (Linnaeus, 1758)			x				x	x	LC	LC
LOPHIIFORMES											
	Antennariidae										
	Antennarius multiocellatus (Valenciennes, 1837)									LC	DD
	Antennarius striatus (Shaw, 1794)		x	x	x	x	x	x		LC	DD
	Ogcocephalidae										
	Ogcocephalus vespertilio (Linnaeus, 1758)	x	x	x	x	x	x	x		NE	LC
TETRAODONTIFORMES											
	Ostraciidae										
	Acanthostracion quadricornis (Linnaeus, 1758)									LC	LC
	Lactophrys trigonus (Linnaeus, 1758)									LC	LC
	Lactophrys triqueter (Linnaeus, 1758)									LC	NE
	Balistidae										
	Balistes vetula Linnaeus, 1758									NT	NT
	Melichthys niger (Bloch, 1786)						x			LC	LC

Monacanthidae											
Aluterus heudelotii Hollard, 1855										LC	LC
Aluterus monoceros (Linnaeus, 1758)										LC	NT
Aluterus schoepfii (Walbaum, 1792)										LC	LC
Cantherhines pullus (Ranzani, 1842)										LC	LC
Monacanthus ciliatus (Mitchill, 1818)										LC	LC
Stephanolepis hispidus (Linnaeus, 1766)										LC	LC
Stephanolepis setifer (Bennett, 1831)										LC	LC
Tetraodontidae											
Canthigaster figueiredoi Moura & Castro, 2002										LC	LC
Colomesus psittacus (Bloch & Schneider, 1801)	x	x	x	x	x	x	x			LC	LC
Lagocephalus laevigatus (Linnaeus, 1766)		x	x	x	x	x	x			LC	LC
Sphoeroides greeleyi Gilbert, 1900			x							LC	LC
Sphoeroides nephelus (Goode & Bean, 1882)										LC	NE
Sphoeroides spengleri (Bloch, 1785)										LC	LC
Sphoeroides testudineus (Linnaeus, 1758)	x	x	x	x	x	x	x	x	x	LC	DD
Sphoeroides tyleri Shipp, 1972										LC	LC
Diodontidae											
Chilomycterus antillarum Jordan & Rutter, 1897										LC	LC
Chilomycterus spinosus spinosus (Linnaeus, 1758)		x	x	x	x		x			LC	LC
Diodon holocanthus Linnaeus, 1758										LC	LC
Diodon hystrix Linnaeus, 1758										LC	LC

Table III: List of fish species recorded in 45 estuaries in north-eastern Brazil, along with their conservation status (ICMbio and IUCN list). Estuaries: Porto do Mangue, Tubarão River, Guamaré, Galinhos, Barra do Rio, Potengí, Forte, Tibau do Sul and Barra de Cunhaú. ICMbio and IUCN classification: endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

Species	Porto do Mangue-RN	Tubarão River-RN	Guamaré-RN	Galinhos-RN	Barra do Rio-RN	Potengí-RN	Forte-RN	Tibau do Sul-RN	Barra de Cunhaú-RN	IUCN	ICMBIO
ORECTOLOBIFORMES											
Ginglymostomatidae											
Ginglymostoma cirratum (Bonnaterre, 1788)										VU	VU
CARCHARHINIFORMES											
Carcharhinidae											
Carcharhinus leucas (Muller & Henle, 1839)										NT	NT
Carcharhinus limbatus (Muller & Henle, 1839)										NT	NT
Carcharhinus porosus (Ranzani, 1839)										CR	CR
Isogomphodon oxyrhynchus (Muller & Henle, 1839)										CR	CR
Rhizoprionodon lalandii (Muller & Henle, 1839)										VU	NT
Rhizoprionodon porosus (Poey, 1861)										VU	DD
Sphyrnidae											
Sphyrna lewini (Griffith & Smith, 1834)										CR	CR
Sphyrna tiburo (Linnaeus, 1758)										EN	CR
Sphyrna tudes (Valenciennes, 1822)										CR	CR
TORPEDINIFORMES											
Narcinidae											
Narcine brasiliensis (Olfers, 1831)			x					x		NT	DD
PRISTIFORMES											
Pristidae											
Pristis pristis Muller & Henle, 1841										CR	CR

Rhinobatidae							
Pseudobatos percellens (Walbaum, 1792)						EN	DD
MYLIOBATIFORMES							
Dasyatidae							
Fontitrygon geijskesi (Boeseman, 1948)						CR	DD
Hypanus americanus (Hildebrand & Schroeder, 1928)						NT	DD
Hypanus guttatus (Bloch & Schneider, 1801)						NT	LC
Hypanus marianae (Gomes, Rosa & Gadig, 2000)						EN	DD
Hypanus say (Lesueur, 1817)						NT	DD
Gymnuridae							
Gymnura micrura (Bloch & Scheneider, 1801)						NT	NT
Myliobatidae							
Aetobatus narinari (Euphrasen, 1790)						EN	DD
Mobula hypostoma (Bancroft, 1831)						EN	VU
Rhinoptera bonasus (Mitchill, 1815)						VU	DD
ELOPIFORMES							
Elopidae							
Elops saurus Linnaeus, 1766		x	x	x	x	LC	NE
Megalopidae							
Megalops atlanticus Valenciennes, 1847		x		x		VU	VU
ALBULIFORMES							
Albulidae							
Albula vulpes (Linnaeus, 1758)	x					NT	DD
ANGUILLIFORMES							
Muraenidae							
Gymnothorax funebris Ranzani, 1839						LC	DD
Gymnothorax moringa (Cuvier, 1829)						LC	DD
Gymnothorax ocellatus Agassiz, 1831						LC	DD

	Gymnothorax vicinus (Castelnau, 1855)								LC	DD
	Ophichthidae									
	Ahlia egmontis (Jordan, 1884)								LC	LC
	Myrichthys breviceps (Richardson, 1848)								LC	LC
	Myrichthys ocellatus (Lesueur, 1825)	x		x		x			LC	LC
	Myrophis punctatus Lütken, 1852						x		LC	LC
	Ophichthus cylindroideus (Ranzani, 1839)								LC	LC
	Ophichthus ophis (Linnaeus, 1758)								LC	LC
	Muraenesocidae									
	Cynoponticus savanna (Bancroft, 1831)								LC	LC
	Congridae									
	Ariosoma balearicum (Delaroche, 1809)								LC	LC
CLUPEIFORMES										
	Pristigasteridae									
	Chirocentrodon bleekerianus (Poey, 1867)			x					LC	LC
	Odontognathus mucronatus Lacepède, 1800				x				LC	LC
	Pellona flavipinnis (Valenciennes,1837)								LC	LC
	Pellona harroweri (Fowler, 1917)		x	x					LC	LC
	Engraulidae									
	Anchoa filifera (Fowler, 1915)								LC	LC
	Anchoa hepsetus (Linnaeus, 1758)								LC	NE
	Anchoa januaria (Steindachner, 1879)								LC	LC
	Anchoa lyolepis (Evermann & Marsh, 1900)								LC	LC
	Anchoa parva (Meek & Hildebrand, 1923)								LC	NE
	Anchoa spinifer (Valenciennes, 1848)								LC	LC
	Anchoa tricolor (Spix & Agassiz, 1829)								LC	LC
	Anchovia clupeoides (Swainson, 1839)				x				LC	LC
	Anchoviella lepidentostole (Fowler, 1911)								LC	LC

	Cetengraulis edentulus (Cuvier, 1829)											LC	LC
	Engraulis anchoita Hubbs & Marini 1935											LC	LC
	Lycengraulis batesii (Gunther, 1868)											LC	LC
	Lycengraulis grossidens (Spix & Agassiz, 1829)											LC	LC
	Pterengraulis atherinoides (Linnaeus, 1766)											LC	LC
	Clupeidae												
	Harengula clupeola (Cuvier, 1829)		x									LC	LC
	Harengula jaguana Poey, 1865				x						x	LC	LC
	Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)				x	x					x	LC	LC
	Opisthonema oglinum (Lesueur, 1818)	x	x	x	x		x					LC	LC
	Platanichthys platana (Regan, 1917)											LC	LC
	Rhinosardinia amazonica (Steindachner, 1879)						x					LC	LC
	Rhinosardinia bahiensis (Steindachner, 1879)											LC	LC
CHARACIFORMES													
	Erythrinidae												
	Hoplias malabaricus (Bloch, 1794)											LC	LC
	Prochilodus argenteus Spix & Agassiz, 1829											NE	LC
	Serrasalmidae												
	Pygocentrus nattereri Kner, 1858											NE	LC
	Serrasalmus rhombeus (Linnaeus, 1766)											NE	LC
	Serrasalmus spilopleura Kner, 1858											NE	LC
	Anostomidae												
	Schizodon fasciatus Spix & Agassiz, 1829											NE	LC
	Leporinus friderici (Bloch, 1794)											NE	LC
	Curimatidae												
	Steindachnerina elegans (Steindachner, 1875)											NE	LC
	Characidae												
	Astyanax bimaculatus (Linnaeus, 1758)											NE	LC

Hemigrammus marginatus Ellis, 1911					NE	LC
SILURIFORMES						
Loricariidae						
Hypostomus plecostomus (Linnaeus, 1758)					NE	NE
Loricaria parnahybae Steindachner, 1907					NE	LC
Ariidae						
Aspistor luniscutis (Valenciennes, 1840)					NE	LC
Aspistor quadriscutis (Valenciennes, 1840)					LC	LC
Bagre bagre (Linnaeus, 1766)					LC	NT
Bagre marinus (Mitchill, 1815)	x	x	x	x	LC	DD
Cathorops agassizii (Eigenmann & Eigenmann, 1888)					NE	LC
Cathorops spixii (Agassiz, 1829)	x	x		x	NE	LC
Genidens genidens (Cuvier, 1829)					LC	LC
Notarius grandicassis (Valenciennes, 1840)					LC	LC
Sciades couma (Valenciennes, 1840)					LC	DD
Sciades herzbergii (Bloch, 1794)					LC	LC
Sciades parkeri (Traill, 1832)					VU	VU
Sciades proops (Valenciennes, 1840)					NE	DD
Aspredinidae						
Aspredo aspredo (Linnaeus, 1758)					LC	LC
Aspredinichthys tibicen (Valenciennes, 1840)					LC	LC
Auchenipteridae						
Ageneiosus inermis (Linnaeus, 1766)					NE	LC
Pseudauchenipterus nodosus (Bloch, 1794)					NE	LC
Trachelyopterus galeatus (Linnaeus, 1766)					NE	LC
Heptapteridae						
Pimelodella cristata (Muller & Troschel, 1849)					LC	LC
Pimelodella lateristriga (Lichtenstein, 1823)					NE	DD

	Pimelodidae									
	Brachyplatystoma vaillantii (Valenciennes, 1840)								NE	LC
	Pseudoplatystoma fasciatum (Linnaeus, 1766)								NE	NE
	Sorubim lima (Bloch & Schneider, 1801)								NE	LC
AULOPIFORMES										
	Synodontidae									
	Synodus foetens (Linnaeus, 1766)		x						LC	LC
	Synodus poeyi Jordan, 1887								LC	LC
	Trachinocephalus myops (Forster, 1801)								LC	LC
HOLOCENTRIFORMES										
	Holocentridae									
	Holocentrus adscensionis (Osbeck, 1765)								LC	LC
BATRACHOIDIFORMES										
	Batrachoididae									
	Amphichthys cryptocentrus (Valenciennes, 1837)		x	x	x				LC	LC
	Batrachoides surinamensis (Bloch & Schneider, 1801)								LC	LC
	Thalassophryne nattereri Steindachner, 1876		x		x	x			LC	LC
	Thalassophryne punctata Steindachner, 1876								NE	LC
KURTIFORMES										
	Apogonidae									
	Phaeoptyx pigmentaria (Poey, 1860)								LC	LC
GOBIIFORMES										
	Eleotridae									
	Dormitator maculatus (Bloch, 1792)	x	x	x	x	x	x	x	LC	NT
	Eleotris pisonis (Gmelin, 1789)					x			LC	LC
	Erotelis smaragdus (Valenciennes, 1837)								LC	LC
	Guavina guavina (Valenciennes, 1837)	x		x	x	x	x	x	LC	LC
	Gobiidae									

	Awaous tajasica (Lichtenstein, 1822)	x							x		LC	LC
	Bathygobius mystacium Ginsburg, 1947					x	x	x			LC	NE
	Bathygobius soporator (Valenciennes, 1837)	x	x	x	x	x	x	x	x	x	LC	LC
	Coryphopterus glaucofraenum Gill, 1863										LC	LC
	Ctenogobius boleosoma (Jordan & Gilbert, 1882)		x	x	x	x	x	x	x	x	LC	LC
	Ctenogobius saepepallens (Gilbert & Randall, 1968)										LC	LC
	Ctenogobius shufeldti (Jordan & Eigenmann, 1887)										LC	LC
	Ctenogobius smaragdus (Valenciennes, 1837)		x						x		LC	LC
	Ctenogobius stigmaticus (Poey, 1860)										LC	LC
	Evorthodus lyricus (Girard, 1858)					x	x		x		LC	LC
	Gobioides broussonnetii Lacepède, 1800										LC	LC
	Gobionellus oceanicus (Pallas, 1770)	x		x		x	x		x	x	LC	LC
	Gobionellus stomatus Starks, 1913								x		NE	LC
	Microdesmus bahianus Dawson, 1973										LC	LC
	Microdesmus longipinnis (Weymouth, 1910)										LC	LC
	Microgobius meeki Evermann & Marsh, 1899					x	x		x		LC	LC
	Pomacentridae											
	Abudefduf saxatilis (Linnaeus, 1758)	x		x	x	x	x	x	x	x	LC	LC
	Stegastes fuscus (Cuvier, 1830)	x		x	x	x	x	x	x	x	LC	LC
	Stegastes variabilis (Castelnau, 1855)	x		x	x	x	x	x	x	x	NE	LC
	Opistognathidae											
	Opistognathus cuvierii Valenciennes, 1836										NE	LC
MUGILIFORMES												
	Mugilidae											
	Mugil brevirostris (Ribeiro, 1915)										NE	NE
	Mugil curema Valenciennes, 1836	x	x	x	x		x	x		x	LC	DD
	Mugil curvidens Valenciennes, 1836			x	x	x	x				LC	DD
	Mugil incilis Hancock, 1830					x	x			x	LC	LC

Mugil liza Valenciennes, 1836	x		x	x		x		x	DD	NT
Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007									LC	DD
CICHLIFORMES										
Cichlidae										
Cichla ocellaris Bloch & Schneider, 1801									NE	LC
Oreochromis niloticus (Linnaeus, 1758)									LC	NE
BLENNIIFORMES										
Dactyloscopidae										
Dactyloscopus crossotus Starks, 1913									LC	LC
Blenniidae										
Scartella cristata (Linnaeus, 1758)									LC	LC
Labrisomidae										
Labrisomus nuchipinnis (Quoy & Gaimard, 1824)									LC	LC
ATHERINIFORMES										
Atherinidae										
Atherinella brasiliensis (Quoy & Gaimard, 1825)			x	x	x	x			LC	LC
Atherinella cf. blackburni (Schultz, 1949)									LC	LC
Odontesthes bonariensis (Valenciennes, 1835)									NE	DD
BELONIFORMES										
Exocoetidae										
Cheilopogon melanurus (Valenciennes, 1847)									LC	LC
Hirundichthys affinis (Gunther, 1866)									LC	LC
Hemiramphidae										
Hemiramphus balao Lesueur, 1821				x		x		x	LC	DD
Hemiramphus brasiliensis (Linnaeus, 1758)				x	x	x	x	x	LC	LC
Hyporhamphus roberti roberti (Valenciennes, 1847)	x						x		LC	LC
Hyporhamphus unifasciatus (Ranzani, 1841)		x				x			LC	NT
Belonidae										

Ablennes hians (Valenciennes, 1846)			x	x	x	x				LC	LC
Strongylura marina (Walbaum, 1792)										LC	LC
Strongylura timucu (Walbaum, 1792)	x	x		x		x				LC	LC
Tylosurus acus acus (Lacepède, 1803)										LC	LC
Tylosurus crocodilus crocodilus (Péron & Lesueur, 1821)										LC	LC
CYPRINODONTIFORMES											
Poeciliidae											
Poecilia vivipara Bloch & Schneider, 1801	x		x	x	x	x			x	NE	LC
CARANGIFORMES											
Rachycentridae											
Rachycentron canadum (Linnaeus, 1766)										LC	LC
Echeneidae											
Echeneis naucrates Linnaeus, 1758		x								LC	LC
Phtheirichthys lineatus (Menzies, 1791)										LC	LC
Remora remora (Linnaeus, 1758)										LC	LC
Carangidae											
Carangoides bartholomaei (Cuvier, 1833)										LC	LC
Caranx crysos (Mitchill, 1815)										LC	LC
Caranx hippos (Linnaeus, 1766)		x								LC	LC
Caranx latus Agassiz, 1831		x								LC	LC
Chloroscombrus chrysurus (Linnaeus, 1766)										LC	LC
Hemicaranx amblyrhynchus (Cuvier, 1833)										LC	LC
Oligoplites palometa (Cuvier, 1832)										LC	LC
Oligoplites saliens (Bloch, 1793)										LC	LC
Oligoplites saurus (Bloch & Schneider, 1801)	x	x				x			x	LC	LC
Selene brownii (Curvier, 1816)										LC	LC
Selene setapinnis (Mitchill, 1815)	x		x	x			x		x	LC	LC
Selene vomer (Linnaeus, 1758)	x	x	x	x					x	LC	LC

Trachinotus carolinus (Linnaeus, 1766)	x		x			x		x	x	LC	LC
Trachinotus cayennensis Cuvier, 1832										LC	DD
Trachinotus falcatus (Linnaeus, 1758)	x	x	x			x		x	x	LC	LC
Trachinotus goodei Jordan & Evermann, 1896	x		x			x			x	LC	LC
ISTIOPHORIFORMES											
Sphyraenidae											
Sphyraena barracuda (Edwards, 1771)		x	x	x					x	LC	LC
Sphyraena guachancho Cuvier, 1829										LC	LC
PLEURONECTIFORMES											
Paralichthyidae											
Citharichthys arenaceus Evermann & Marsh, 1900										LC	LC
Citharichthys cornutus (Günther, 1880)		x								LC	LC
Citharichthys macrops Dresel, 1885		x								LC	LC
Citharichthys spilopterus Günther, 1862		x								LC	LC
Etropus crossotus Jordan & Gilbert, 1882										LC	LC
Etropus longimanus Norman, 1933										NE	LC
Paralichthys brasiliensis (Ranzani, 1842)	x		x			x		x		NE	LC
Paralichthys orbignyanus (Valenciennes, 1839)										DD	DD
Paralichthys tropicus Ginsburg, 1933										DD	NE
Syacium micrurum Ranzani, 1842	x		x	x	x	x		x	x	LC	LC
Syacium papillosum (Linnaeus, 1758)	x	x	x	x	x	x		x	x	LC	LC
Bothidae											
Bothus lunatus (Linnaeus, 1758)	x		x					x		LC	LC
Bothus ocellatus (Agassiz, 1831)	x	x	x	x	x	x	x	x	x	LC	LC
Bothus robinsi Topp & Hoff, 1972	x			x				x	x	LC	LC
Achiridae											
Achirus achirus (Linnaeus, 1758)										LC	LC
Achirus declivis Chabanaud, 1940										LC	LC

	Achirus lineatus (Linnaeus, 1758)	x	x	x		x			x	x	LC	LC
	Achirus mucuri Ramos, Ramos & Lopes, 2009										NE	VU
	Trinectes microphthalmus (Chabanaud, 1928)	x		x			x		x	x	LC	LC
	Trinectes paulistanus (Miranda Ribeiro, 1915)	x		x					x		LC	LC
	Cynoglossidae											
	Symphurus diomedeanus (Goode & Bean, 1885)										LC	LC
	Symphurus plagusia (Bloch & Schneider, 1801)										LC	LC
	Symphurus tessellatus (Quoy & Gaimard, 1824)										LC	LC
SYNGNATHIFORMES												
	Syngnathidae											
	Bryx dunckeri (Metzelaar, 1919)										LC	LC
	Cosmocampus elucens (Poey, 1868)		x								LC	LC
	Hippocampus erectus Perry, 1810	x		x	x						VU	VU
	Hippocampus reidi Ginsburg, 1933	x	x	x	x						NT	VU
	Microphis brachyurus lineatus (Kaup, 1856)										NE	NE
	Microphis brachyurus brachyurus (Bleeker, 1854)										LC	LC
	Fistulariidae											
	Fistularia petimba Lacepède, 1803										LC	LC
	Fistularia tabacaria Linnaeus, 1758	x			x	x	x			x	LC	LC
	Syngnathus pelagicus Linnaeus, 1758										LC	LC
	Dactylopteridae											
	Dactylopterus volitans (Linnaeus, 1758)		x								LC	LC
SCOMBRIFORMES												
	Trichiuridae											
	Trichiurus lepturus Linnaeus, 1758										LC	LC
	Scombridae											
	Euthynnus alletteratus (Rafinesque, 1810)										LC	LC

	Scomberomorus brasiliensis Collette, Russo & Zavala-Camin, 1978		x								LC	LC
	Scomberomorus cavalla (Cuvier, 1829)										LC	LC
	Scomberomorus maculatus (Mitchill, 1815)										LC	NE
	Scomberomorus regalis (Bloch, 1793)										LC	LC
	Stromateidae											
	Peprilus paru (Linnaeus, 1758)										LC	LC
TRACHINIFORMES												
	Uranoscopidae											
	Astroscopus y-graecum Cuvier, 1829										LC	LC
LABRIFORMES												
	Labridae											
	Halichoeres poeyi (Steindachner, 1867)										LC	LC
	Scaridae											
	Nicholsina usta (Valenciennes, 1840)		x								LC	LC
	Sparisoma amplum (Ranzani, 1842)										LC	NT
	Sparisoma axillare (Steindachner, 1878)										DD	VU
	Sparisoma radians (Valenciennes, 1840)	x		x	x			x			LC	LC
PERCIFORMES												
	Centropomidae											
	Centropomus ensiferus Poey, 1860	x							x		LC	LC
	Centropomus mexicanus Bocourt, 1868						x				LC	LC
	Centropomus parallelus Poey, 1860					x	x				LC	LC
	Centropomus pectinatus Poey, 1860					x					LC	LC
	Centropomus undecimalis (Bloch, 1792)	x	x	x	x	x	x				LC	LC
	Gerreidae											
	Diapterus auratus Ranzani, 1842		x			x	x				LC	LC
	Diapterus rhombeus (Cuvier, 1829)	x	x	x	x	x	x	x	x	x	LC	LC

Eucinostomus argenteus Baird & Girard, 1855	x	x	x	x	x	x	x	x		LC	LC
Eucinostomus gula (Quoy & Gaimard, 1824)	x		x	x	x	x	x	x	x	LC	LC
Eucinostomus havana (Nichols, 1912)										LC	LC
Eucinostomus melanopterus (Bleeker, 1863)	x	x	x	x	x	x		x	x	LC	LC
Eugerres brasilianus (Cuvier, 1830)		x	x	x	x	x			x	LC	LC
Gerres cinereus (Walbaum, 1792)										LC	LC
Ulaema lefroyi (Goode, 1874)		x	x	x	x	x	x	x	x	LC	LC
Mullidae											
Pseudupeneus maculatus (Bloch, 1793)	x		x	x		x	x	x	x	LC	LC
Serranidae											
Alphestes afer (Bloch, 1793)		x								LC	DD
Diplectrum radiale (Quoy & Gaimard, 1824)		x								LC	LC
Epinephelus adscensionis (Osbeck, 1765)		x								LC	DD
Epinephelus itajara (Lichtenstein, 1822)	x		x			x				VU	CR
Hyporthodus nigritus (Holbrook, 1855)		x								NT	EN
Mycteroperca bonaci (Poey, 1860)	x	x	x							NT	VU
Mycteroperca tigris (Valenciennes, 1833)		x								DD	DD
Mycteroperca venenosa (Linnaeus, 1758)						x				NT	DD
Rypticus randalli Courtenay, 1967						x			x	LC	LC
Rypticus saponaceus (Bloch & Schneider, 1801)										LC	LC
Serranus flaviventris (Cuvier, 1829)										LC	LC
Serranus phoebe Poey, 1851		x								LC	LC
Pomacanthidae											
Pomacanthus arcuatus (Linnaeus, 1758)										LC	DD
Pomacanthus paru (Bloch, 1787)	x		x	x		x	x	x	x	LC	DD
Chaetodontidae											
Chaetodon ocellatus (Bloch, 1787)										LC	DD
Chaetodon striatus Linnaeus, 1758										LC	LC

Haemulidae											
Anisotremus surinamensis (Bloch, 1791)		x								DD	DD
Anisotremus virginicus (Linnaeus, 1758)	x		x	x	x	x	x	x		LC	LC
Conodon nobilis (Linnaeus, 1758)	x		x	x						LC	LC
Genyatremus luteus (Bloch, 1790)	x				x	x		x	x	NE	LC
Haemulon aurolineatum Cuvier, 1830	x		x	x	x	x	x	x	x	LC	LC
Haemulon parra (Desmarest, 1823)	x		x	x	x	x		x		LC	LC
Haemulon plumierii (Lacepède, 1801)	x		x	x	x	x	x	x	x	LC	DD
Haemulon squamipinna Rocha & Rosa, 1999										NE	LC
Haemulon steindachneri (Jordan & Gilbert, 1882)	x		x	x	x	x	x	x		LC	LC
Orthopristis ruber (Cuvier, 1830)	x	x	x	x	x	x	x	x	x	LC	LC
Pomadasys corvinaeformis (Steindachner, 1868)	x	x	x	x	x	x	x	x	x	LC	LC
Pomadasys crocro (Cuvier, 1830)						x				DD	LC
Pomadasys ramosus Poey, 1860										NE	LC
Lutjanidae											
Lutjanus alexandrei Moura & Linderman, 2007		x								NE	LC
Lutjanus analis (Cuvier, 1828)	x	x	x	x	x	x	x	x	x	NT	NT
Lutjanus apodus (Walbaum, 1792)	x	x	x	x	x	x	x	x	x	LC	NE
Lutjanus cyanopterus (Cuvier, 1828)	x	x	x	x	x	x	x	x	x	VU	VU
Lutjanus griseus (Linnaeus, 1758)	x	x	x	x	x	x	x	x	x	LC	NE
Lutjanus jocu (Bloch & Schneider, 1801)	x	x	x	x	x	x		x	x	DD	NT
Lutjanus synagris (Linnaeus, 1758)	x	x	x	x		x		x	x	NT	NT
Ocyurus chrysurus (Bloch, 1791)		x								DD	NT
Polynemidae											
Polydactylus oligodon (Gunther, 1860)						x				LC	LC
Polydactylus virginicus (Linnaeus, 1758)	x		x	x	x	x	x	x	x	LC	LC
SCORPAENIFORMES											
Scorpaenidae											

Scorpaena isthmensis Meek & Hilderbrand, 1928		x							LC	LC
Scorpaena plumieri Bloch, 1789		x							LC	LC
Triglidae										
Prionotus punctatus (Bloch, 1793)		x							LC	LC
MORONIFORMES										
Ephippidae										
Chaetodipterus faber (Broussonet, 1782)		x							LC	LC
ACANTHURIFORMES										
Sciaenidae										
Bairdiella ronchus (Cuvier, 1830)	x								LC	LC
Cynoscion acoupa (Lacepède, 1801)	x		x	x	x	x		x	x	LC	NT
Cynoscion jamaicensis (Vaillant & Bocourt, 1833)									LC	LC
Cynoscion leiarchus (Cuvier, 1830)	x		x	x		x		x	x	LC	LC
Cynoscion microlepidotus (Cuvier, 1830)								x		LC	LC
Cynoscion steindachneri (Jordan, 1889)										LC	LC
Cynoscion virescens (Cuvier, 1830)										LC	LC
Isopisthus parvipinnis (Cuvier, 1830)										LC	LC
Larimus breviceps Cuvier, 1830	x		x	x		x		x	x	LC	LC
Macrodon ancylodon (Bloch & Schneider, 1801)										LC	LC
Menticirrhus americanus (Linnaeus, 1758)	x		x	x	x	x	x	x	x	LC	DD
Menticirrhus littoralis (Holbrook, 1847)										LC	DD
Micropogonias furnieri (Desmarest, 1823)	x		x	x		x		x	x	LC	LC
Nebris microps Cuvier, 1830										LC	LC
Odontoscion dentex (Cuvier, 1830)										LC	LC
Ophioscion punctatissimus Meek & Hildebrand, 1925										LC	DD
Paralonchurus brasiliensis (Steindachner, 1875)	x		x	x	x	x		x	x	LC	LC
Pareques acuminatus (Bloch & Schneider, 1801)										LC	DD
Pogonias cromis (Linnaeus, 1766)										LC	EN

	Stellifer brasiliensis (Schultz, 1945)										NE	LC
	Stellifer microps (Steindachner, 1864)										LC	LC
	Stellifer naso (Jordan, 1889)										LC	LC
	Stellifer rastrifer (Jordan, 1889)										LC	LC
	Stellifer stellifer (Bloch, 1790)	x		x	x	x	x	x	x	x	DD	LC
	Umbrina coroides Cuvier, 1830										LC	LC
	Acanthuridae											
	Acanthurus bahianus Castelnau, 1855										LC	LC
	Acanthurus chirurgus (Bloch, 1787)	x	x	x	x	x		x	x		LC	LC
	Acanthurus coeruleus Bloch & Schneider, 1801		x	x	x	x	x	x	x	x	LC	LC
SPARIFORMES												
	Lobotidae											
	Lobotes surinamensis (Bloch, 1790)										LC	LC
	Sparidae											
	Archosargus probatocephalus (Walbaum, 1792)		x	x		x	x		x		LC	DD
	Archosargus rhomboidalis (Linnaeus, 1758)	x	x	x		x				x	LC	LC
LOPHIIFORMES												
	Antennariidae											
	Antennarius multiocellatus (Valenciennes, 1837)										LC	DD
	Antennarius striatus (Shaw, 1794)		x								LC	DD
	Ogcocephalidae											
	Ogcocephalus vespertilio (Linnaeus, 1758)		x								NE	LC
TETRAODONTIFORMES												
	Ostraciidae											
	Acanthostracion quadricornis (Linnaeus, 1758)										LC	LC
	Lactophrys trigonus (Linnaeus, 1758)										LC	LC
	Lactophrys triqueter (Linnaeus, 1758)										LC	NE
	Balistidae											

Balistes vetula Linnaeus, 1758										NT	NT
Melichthys niger (Bloch, 1786)										LC	LC
Monacanthidae											
Aluterus heudelotii Hollard, 1855										LC	LC
Aluterus monoceros (Linnaeus, 1758)										LC	NT
Aluterus schoepfii (Walbaum, 1792)										LC	LC
Cantherhines pullus (Ranzani, 1842)										LC	LC
Monacanthus ciliatus (Mitchill, 1818)		x								LC	LC
Stephanolepis hispidus (Linnaeus, 1766)		x								LC	LC
Stephanolepis setifer (Bennett, 1831)										LC	LC
Tetraodontidae											
Canthigaster figueiredoi Moura & Castro, 2002										LC	LC
Colomesus psittacus (Bloch & Schneider, 1801)	x					x		x	x	LC	LC
Lagocephalus laevigatus (Linnaeus, 1766)	x	x	x		x	x			x	LC	LC
Sphoeroides greeleyi Gilbert, 1900	x	x		x						LC	LC
Sphoeroides nephelus (Goode & Bean, 1882)										LC	NE
Sphoeroides spengleri (Bloch, 1785)	x	x	x	x						LC	LC
Sphoeroides testudineus (Linnaeus, 1758)	x	x	x	x		x	x	x	x	LC	DD
Sphoeroides tyleri Shipp, 1972		x								LC	LC
Diodontidae											
Chilomycterus antillarum Jordan & Rutter, 1897	x		x	x	x	x	x	x	x	LC	LC
Chilomycterus spinosus spinosus (Linnaeus, 1758)		x								LC	LC
Diodon holocanthus Linnaeus, 1758	x		x	x				x		LC	LC
Diodon hystrix Linnaeus, 1758										LC	LC

Table IV: List of fish species recorded in 45 estuaries in north-eastern Brazil, along with their conservation status (ICMbio and IUCN list). Estuaries: Mamanguape River, Miriri River, Paraíba River, Itapessoca, Santa Cruz, Jaguaribe- PE, Suape, Sirinhaém and Maracaípe. ICMbio and IUCN classification: endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

Species	Mamanguape River-PB	Miriri River-PB	Paraiba River-PB	Itapessoca-PE	Santa Cruz-PE	Jaguaribe-PE	Suape-PE	Sirinhaém-PE	Maracaípe-PE	IUCN	ICMBIO
ORECTOLOBIFORMES											
Ginglymostomatidae											
Ginglymostoma cirratum (Bonnaterre, 1788)										VU	VU
CARCHARHINIFORMES											
Carcharhinidae											
Carcharhinus leucas (Muller & Henle, 1839)										NT	NT
Carcharhinus limbatus (Muller & Henle, 1839)										NT	NT
Carcharhinus porosus (Ranzani, 1839)										CR	CR
Isogomphodon oxyrhynchus (Muller & Henle, 1839)										CR	CR
Rhizoprionodon lalandii (Muller & Henle, 1839)	x									VU	NT
Rhizoprionodon porosus (Poey, 1861)										VU	DD
Sphyrnidae											
Sphyrna lewini (Griffith & Smith, 1834)										CR	CR
Sphyrna tiburo (Linnaeus, 1758)										EN	CR
Sphyrna tudes (Valenciennes, 1822)										CR	CR
TORPEDINIFORMES											
Narcinidae											
Narcine brasiliensis (Olfers, 1831)					x					NT	DD
PRISTIFORMES											
Pristidae											
Pristis pristis Muller & Henle, 1841										CR	CR

Rhinobatidae											
Pseudobatos percellens (Walbaum, 1792)										EN	DD
MYLIOBATIFORMES											
Dasyatidae											
Fontitrygon geijskesi (Boeseman, 1948)										CR	DD
Hypanus americanus (Hildebrand & Schroeder, 1928)										NT	DD
Hypanus guttatus (Bloch & Schneider, 1801)	x				x	x		x		NT	LC
Hypanus marianae (Gomes, Rosa & Gadig, 2000)										EN	DD
Hypanus say (Lesueur, 1817)										NT	DD
Gymnuridae											
Gymnura micrura (Bloch & Scheneider, 1801)	x									NT	NT
Myliobatidae											
Aetobatus narinari (Euphrasen, 1790)	x									EN	DD
Mobula hypostoma (Bancroft, 1831)										EN	VU
Rhinoptera bonasus (Mitchill, 1815)	x									VU	DD
ELOPIFORMES											
Elopidae											
Elops saurus Linnaeus, 1766	x			x	x	x				LC	NE
Megalopidae											
Megalops atlanticus Valenciennes, 1847	x	x			x	x		x		VU	VU
ALBULIFORMES											
Albulidae											
Albula vulpes (Linnaeus, 1758)	x				x	x	x		x	NT	DD
ANGUILLIFORMES											
Muraenidae											
Gymnothorax funebris Ranzani, 1839	x	x			x	x		x		LC	DD
Gymnothorax moringa (Cuvier, 1829)					x		x			LC	DD
Gymnothorax ocellatus Agassiz, 1831	x				x					LC	DD

	Gymnothorax vicinus (Castelnau, 1855)	x										LC	DD
	Ophichthidae												
	Ahlia egmontis (Jordan, 1884)							x				LC	LC
	Myrichthys breviceps (Richardson, 1848)	x										LC	LC
	Myrichthys ocellatus (Lesueur, 1825)	x			x		x				x	LC	LC
	Myrophis punctatus Lütken, 1852					x				x		LC	LC
	Ophichthus cylindroideus (Ranzani, 1839)	x								x		LC	LC
	Ophichthus ophis (Linnaeus, 1758)	x								x		LC	LC
	Muraenesocidae												
	Cynoponticus savanna (Bancroft, 1831)					x						LC	LC
	Congridae												
	Ariosoma balearicum (Delaroche, 1809)							x				LC	LC
CLUPEIFORMES													
	Pristigasteridae												
	Chirocentrodon bleekerianus (Poey, 1867)					x						LC	LC
	Odontognathus mucronatus Lacepède, 1800	x										LC	LC
	Pellona flavipinnis (Valenciennes,1837)											LC	LC
	Pellona harroweri (Fowler, 1917)	x										LC	LC
	Engraulidae												
	Anchoa filifera (Fowler, 1915)					x		x				LC	LC
	Anchoa hepsetus (Linnaeus, 1758)											LC	NE
	Anchoa januaria (Steindachner, 1879)	x		x		x		x	x			LC	LC
	Anchoa lyolepis (Evermann & Marsh, 1900)				x	x						LC	LC
	Anchoa parva (Meek & Hildebrand, 1923)					x						LC	NE
	Anchoa spinifer (Valenciennes, 1848)	x	x			x		x	x		x	LC	LC
	Anchoa tricolor (Spix & Agassiz, 1829)	x				x		x	x		x	LC	LC
	Anchovia clupeoides (Swainson, 1839)	x	x			x	x	x	x		x	LC	LC
	Anchoviella lepidentostole (Fowler, 1911)				x		x				x	LC	LC

Cetengraulis edentulus (Cuvier, 1829)	x	x			x		x	x	x	LC	LC
Engraulis anchoita Hubbs & Marini 1935					x					LC	LC
Lycengraulis batesii (Gunther, 1868)										LC	LC
Lycengraulis grossidens (Spix & Agassiz, 1829)	x	x	x	x	x	x	x	x		LC	LC
Pterengraulis atherinoides (Linnaeus, 1766)										LC	LC
Clupeidae											
Harengula clupeola (Cuvier, 1829)	x			x	x	x	x	x	x	LC	LC
Harengula jaguana Poey, 1865							x			LC	LC
Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)				x	x	x	x	x	x	LC	LC
Opisthonema oglinum (Lesueur, 1818)	x		x		x	x	x	x		LC	LC
Platanichthys platana (Regan, 1917)					x		x			LC	LC
Rhinosardinia amazonica (Steindachner, 1879)	x	x								LC	LC
Rhinosardinia bahiensis (Steindachner, 1879)										LC	LC
CHARACIFORMES											
Erythrinidae											
Hoplias malabaricus (Bloch, 1794)										LC	LC
Prochilodus argenteus Spix & Agassiz, 1829										NE	LC
Serrasalmidae											
Pygocentrus nattereri Kner, 1858										NE	LC
Serrasalmus rhombeus (Linnaeus, 1766)										NE	LC
Serrasalmus spilopleura Kner, 1858										NE	LC
Anostomidae											
Schizodon fasciatus Spix & Agassiz, 1829										NE	LC
Leporinus friderici (Bloch, 1794)										NE	LC
Curimatidae											
Steindachnerina elegans (Steindachner, 1875)										NE	LC
Characidae											
Astyanax bimaculatus (Linnaeus, 1758)										NE	LC

Hemigrammus marginatus Ellis, 1911										NE	LC
SILURIFORMES											
Loricariidae											
Hypostomus plecostomus (Linnaeus, 1758)										NE	NE
Loricaria parnahybae Steindachner, 1907										NE	LC
Ariidae											
Aspistor luniscutis (Valenciennes, 1840)					x			x		NE	LC
Aspistor quadriscutis (Valenciennes, 1840)	x	x						x		LC	LC
Bagre bagre (Linnaeus, 1766)										LC	NT
Bagre marinus (Mitchill, 1815)	x				x					LC	DD
Cathorops agassizii (Eigenmann & Eigenmann, 1888)					x			x		NE	LC
Cathorops spixii (Agassiz, 1829)	x	x			x	x		x	x	NE	LC
Genidens genidens (Cuvier, 1829)	x									LC	LC
Notarius grandicassis (Valenciennes, 1840)			x					x		LC	LC
Sciades couma (Valenciennes, 1840)										LC	DD
Sciades herzbergii (Bloch, 1794)	x	x			x		x	x		LC	LC
Sciades parkeri (Traill, 1832)					x			x		VU	VU
Sciades proops (Valenciennes, 1840)	x				x					NE	DD
Aspredinidae											
Aspredo aspredo (Linnaeus, 1758)										LC	LC
Aspredinichthys tibicen (Valenciennes, 1840)										LC	LC
Auchenipteridae											
Ageneiosus inermis (Linnaeus, 1766)										NE	LC
Pseudauchenipterus nodosus (Bloch, 1794)										NE	LC
Trachelyopterus galeatus (Linnaeus, 1766)										NE	LC
Heptapteridae											
Pimelodella cristata (Muller & Troschel, 1849)										LC	LC
Pimelodella lateristriga (Lichtenstein, 1823)										NE	DD

	Pimelodidae													
	Brachyplatystoma vaillantii (Valenciennes, 1840)												NE	LC
	Pseudoplatystoma fasciatum (Linnaeus, 1766)												NE	NE
	Sorubim lima (Bloch & Schneider, 1801)												NE	LC
AULOPIFORMES														
	Synodontidae													
	Synodus foetens (Linnaeus, 1766)					x			x			x	LC	LC
	Synodus poeyi Jordan, 1887					x							LC	LC
	Trachinocephalus myops (Forster, 1801)												LC	LC
HOLOCENTRIFORMES														
	Holocentridae													
	Holocentrus adscensionis (Osbeck, 1765)								x				LC	LC
BATRACHOIDIFORMES														
	Batrachoididae													
	Amphichthys cryptocentrus (Valenciennes, 1837)					x							LC	LC
	Batrachoides surinamensis (Bloch & Schneider, 1801)					x							LC	LC
	Thalassophryne nattereri Steindachner, 1876	x		x		x		x	x			x	LC	LC
	Thalassophryne punctata Steindachner, 1876	x											NE	LC
KURTIFORMES														
	Apogonidae													
	Phaeoptyx pigmentaria (Poey, 1860)								x				LC	LC
GOBIIFORMES														
	Eleotridae													
	Dormitator maculatus (Bloch, 1792)					x		x					LC	NT
	Eleotris pisonis (Gmelin, 1789)	x		x		x							LC	LC
	Erotelis smaragdus (Valenciennes, 1837)					x			x				LC	LC
	Guavina guavina (Valenciennes, 1837)				x	x		x			x		LC	LC
	Gobiidae													

Awaous tajasica (Lichtenstein, 1822)									LC	LC
Bathygobius mystacium Ginsburg, 1947									LC	NE
Bathygobius soporator (Valenciennes, 1837)	x	x	x	x	x	x		x	LC	LC
Coryphopterus glaucofraenum Gill, 1863	x								LC	LC
Ctenogobius boleosoma (Jordan & Gilbert, 1882)	x	x	x	x	x	x	x	x	LC	LC
Ctenogobius saepepallens (Gilbert & Randall, 1968)						x			LC	LC
Ctenogobius shufeldti (Jordan & Eigenmann, 1887)				x					LC	LC
Ctenogobius smaragdus (Valenciennes, 1837)	x			x	x	x			LC	LC
Ctenogobius stigmaticus (Poey, 1860)				x					LC	LC
Evorthodus lyricus (Girard, 1858)				x					LC	LC
Gobioides broussonnetii Lacepède, 1800								x	LC	LC
Gobionellus oceanicus (Pallas, 1770)	x	x		x	x	x	x	x	LC	LC
Gobionellus stomatus Starks, 1913		x		x	x	x			NE	LC
Microdesmus bahianus Dawson, 1973									LC	LC
Microdesmus longipinnis (Weymouth, 1910)									LC	LC
Microgobius meeki Evermann & Marsh, 1899				x					LC	LC
Pomacentridae										
Abudefduf saxatilis (Linnaeus, 1758)	x			x		x			LC	LC
Stegastes fuscus (Cuvier, 1830)	x								LC	LC
Stegastes variabilis (Castelnau, 1855)	x			x		x			NE	LC
Opistognathidae										
Opistognathus cuvierii Valenciennes, 1836									NE	LC
MUGILIFORMES										
Mugilidae										
Mugil brevirostris (Ribeiro, 1915)						x			NE	NE
Mugil curema Valenciennes, 1836	x	x		x	x	x	x	x	LC	DD
Mugil curvidens Valenciennes, 1836	x	x		x		x	x	x	LC	DD
Mugil incilis Hancock, 1830						x	x	x	LC	LC

Mugil liza Valenciennes, 1836					x	x	x	x	x	DD	NT
Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007					x		x			LC	DD
CICHLIFORMES											
Cichlidae											
Cichla ocellaris Bloch & Schneider, 1801										NE	LC
Oreochromis niloticus (Linnaeus, 1758)										LC	NE
BLENNIIFORMES											
Dactyloscopidae											
Dactyloscopus crossotus Starks, 1913									x	LC	LC
Blenniidae											
Scartella cristata (Linnaeus, 1758)							x			LC	LC
Labrisomidae											
Labrisomus nuchipinnis (Quoy & Gaimard, 1824)				x			x			LC	LC
ATHERINIFORMES											
Atherinidae											
Atherinella brasiliensis (Quoy & Gaimard, 1825)	x	x	x	x	x	x	x	x	x	LC	LC
Atherinella cf. blackburni (Schultz, 1949)									x	LC	LC
Odontesthes bonariensis (Valenciennes, 1835)										NE	DD
BELONIFORMES											
Exocoetidae											
Cheilopogon melanurus (Valenciennes, 1847)										LC	LC
Hirundichthys affinis (Gunther, 1866)										LC	LC
Hemiramphidae											
Hemiramphus balao Lesueur, 1821	x				x		x	x		LC	DD
Hemiramphus brasiliensis (Linnaeus, 1758)	x				x	x	x			LC	LC
Hyporhamphus roberti roberti (Valenciennes, 1847)	x	x		x	x	x	x	x	x	LC	LC
Hyporhamphus unifasciatus (Ranzani, 1841)										LC	NT
Belonidae											

Ablennes hians (Valenciennes, 1846)									x	LC	LC
Strongylura marina (Walbaum, 1792)			x		x			x	x	LC	LC
Strongylura timucu (Walbaum, 1792)	x	x		x	x	x	x	x	x	LC	LC
Tylosurus acus acus (Lacepède, 1803)					x				x	LC	LC
Tylosurus crocodilus crocodilus (Péron & Lesueur, 1821)									x	LC	LC
CYPRINODONTIFORMES											
Poeciliidae											
Poecilia vivipara Bloch & Schneider, 1801				x	x	x				NE	LC
CARANGIFORMES											
Rachycentridae											
Rachycentron canadum (Linnaeus, 1766)	x									LC	LC
Echeneidae											
Echeneis naucrates Linnaeus, 1758	x	x			x					LC	LC
Phtheirichthys lineatus (Menzies, 1791)										LC	LC
Remora remora (Linnaeus, 1758)										LC	LC
Carangidae											
Carangoides bartholomaei (Cuvier, 1833)	x						x	x	x	LC	LC
Caranx crysos (Mitchill, 1815)			x		x	x		x		LC	LC
Caranx hippos (Linnaeus, 1766)		x			x	x	x	x	x	LC	LC
Caranx latus Agassiz, 1831	x	x			x	x	x	x	x	LC	LC
Chloroscombrus chrysurus (Linnaeus, 1766)	x		x		x			x		LC	LC
Hemicaranx amblyrhynchus (Cuvier, 1833)										LC	LC
Oligoplites palometa (Cuvier, 1832)	x	x	x	x	x	x		x		LC	LC
Oligoplites saliens (Bloch, 1793)		x	x		x			x		LC	LC
Oligoplites saurus (Bloch & Schneider, 1801)				x	x	x	x	x	x	LC	LC
Selene brownii (Curvier, 1816)										LC	LC
Selene setapinnis (Mitchill, 1815)					x		x			LC	LC
Selene vomer (Linnaeus, 1758)	x			x	x	x	x	x		LC	LC

Trachinotus carolinus (Linnaeus, 1766)									LC	LC
Trachinotus cayennensis Cuvier, 1832									LC	DD
Trachinotus falcatus (Linnaeus, 1758)	x			x		x	x		LC	LC
Trachinotus goodei Jordan & Evermann, 1896	x								LC	LC
ISTIOPHORIFORMES										
Sphyraenidae										
Sphyraena barracuda (Edwards, 1771)	x		x	x	x	x	x	x	LC	LC
Sphyraena guachancho Cuvier, 1829				x		x		x	LC	LC
PLEURONECTIFORMES										
Paralichthyidae										
Citharichthys arenaceus Evermann & Marsh, 1900	x	x			x	x		x	LC	LC
Citharichthys cornutus (Günther, 1880)									LC	LC
Citharichthys macrops Dresel, 1885			x					x	LC	LC
Citharichthys spilopterus Günther, 1862	x	x		x		x	x	x	LC	LC
Etropus crossotus Jordan & Gilbert, 1882	x			x		x		x	LC	LC
Etropus longimanus Norman, 1933				x					NE	LC
Paralichthys brasiliensis (Ranzani, 1842)				x	x	x		x	NE	LC
Paralichthys orbignyanus (Valenciennes, 1839)				x					DD	DD
Paralichthys tropicus Ginsburg, 1933									DD	NE
Syacium micrurum Ranzani, 1842	x			x		x			LC	LC
Syacium papillosum (Linnaeus, 1758)									LC	LC
Bothidae										
Bothus lunatus (Linnaeus, 1758)									LC	LC
Bothus ocellatus (Agassiz, 1831)	x		x	x		x		x	LC	LC
Bothus robinsi Topp & Hoff, 1972								x	LC	LC
Achiridae										
Achirus achirus (Linnaeus, 1758)				x			x		LC	LC
Achirus declivis Chabanaud, 1940	x			x			x	x	LC	LC

	Achirus lineatus (Linnaeus, 1758)	x	x	x	x	x	x	x	x	x	LC	LC
	Achirus mucuri Ramos, Ramos & Lopes, 2009								x		NE	VU
	Trinectes microphthalmus (Chabanaud, 1928)	x							x		LC	LC
	Trinectes paulistanus (Miranda Ribeiro, 1915)	x	x			x			x	x	LC	LC
	Cynoglossidae											
	Symphurus diomedeanus (Goode & Bean, 1885)							x			LC	LC
	Symphurus plagusia (Bloch & Schneider, 1801)			x		x	x			x	LC	LC
	Symphurus tessellatus (Quoy & Gaimard, 1824)	x				x		x	x	x	LC	LC
SYNGNATHIFORMES												
	Syngnathidae											
	Bryx dunckeri (Metzelaar, 1919)					x				x	LC	LC
	Cosmocampus elucens (Poey, 1868)				x	x	x	x			LC	LC
	Hippocampus erectus Perry, 1810					x		x		x	VU	VU
	Hippocampus reidi Ginsburg, 1933	x	x			x				x	NT	VU
	Microphis brachyurus lineatus (Kaup, 1856)				x		x				NE	NE
	Microphis brachyurus brachyurus (Bleeker, 1854)	x									LC	LC
	Fistulariidae											
	Fistularia petimba Lacepède, 1803						x	x			LC	LC
	Fistularia tabacaria Linnaeus, 1758					x	x	x			LC	LC
	Syngnathus pelagicus Linnaeus, 1758				x		x	x		x	LC	LC
	Dactylopteridae											
	Dactylopterus volitans (Linnaeus, 1758)	x				x	x		x	x	LC	LC
SCOMBRIFORMES												
	Trichiuridae											
	Trichiurus lepturus Linnaeus, 1758	x				x			x		LC	LC
	Scombridae											
	Euthynnus alletteratus (Rafinesque, 1810)	x									LC	LC

	Scomberomorus brasiliensis Collette, Russo & Zavala-Camin, 1978	x			x	x				LC	LC
	Scomberomorus cavalla (Cuvier, 1829)	x								LC	LC
	Scomberomorus maculatus (Mitchill, 1815)									LC	NE
	Scomberomorus regalis (Bloch, 1793)				x					LC	LC
	Stromateidae										
	Peprilus paru (Linnaeus, 1758)	x			x			x		LC	LC
TRACHINIFORMES											
	Uranoscopidae										
	Astroscopus y-graecum Cuvier, 1829								x	LC	LC
LABRIFORMES											
	Labridae										
	Halichoeres poeyi (Steindachner, 1867)	x								LC	LC
	Scaridae										
	Nicholsina usta (Valenciennes, 1840)									LC	LC
	Sparisoma amplum (Ranzani, 1842)					x	x			LC	NT
	Sparisoma axillare (Steindachner, 1878)	x			x		x			DD	VU
	Sparisoma radians (Valenciennes, 1840)			x	x				x	LC	LC
PERCIFORMES											
	Centropomidae										
	Centropomus ensiferus Poey, 1860	x						x		LC	LC
	Centropomus mexicanus Bocourt, 1868	x	x				x	x		LC	LC
	Centropomus parallelus Poey, 1860			x	x	x	x	x	x	LC	LC
	Centropomus pectinatus Poey, 1860	x	x		x		x	x	x	LC	LC
	Centropomus undecimalis (Bloch, 1792)	x	x	x	x	x	x	x	x	LC	LC
	Gerreidae										
	Diapterus auratus Ranzani, 1842	x			x	x	x	x	x	LC	LC
	Diapterus rhombeus (Cuvier, 1829)	x	x	x	x	x	x	x	x	LC	LC

Eucinostomus argenteus Baird & Girard, 1855	x			x	x	x	x	x	x	LC	LC
Eucinostomus gula (Quoy & Gaimard, 1824)	x			x	x	x	x	x	x	LC	LC
Eucinostomus havana (Nichols, 1912)					x		x		x	LC	LC
Eucinostomus melanopterus (Bleeker, 1863)	x	x		x	x	x	x	x	x	LC	LC
Eugerres brasilianus (Cuvier, 1830)	x	x		x	x	x	x	x	x	LC	LC
Gerres cinereus (Walbaum, 1792)					x			x		LC	LC
Ulaema lefroyi (Goode, 1874)					x	x	x		x	LC	LC
Mullidae											
Pseudupeneus maculatus (Bloch, 1793)					x		x		x	LC	LC
Serranidae											
Alphestes afer (Bloch, 1793)										LC	DD
Diplectrum radiale (Quoy & Gaimard, 1824)							x			LC	LC
Epinephelus adscensionis (Osbeck, 1765)	x				x		x		x	LC	DD
Epinephelus itajara (Lichtenstein, 1822)	x				x		x			VU	CR
Hyporthodus nigritus (Holbrook, 1855)										NT	EN
Mycteroperca bonaci (Poey, 1860)					x		x			NT	VU
Mycteroperca tigris (Valenciennes, 1833)										DD	DD
Mycteroperca venenosa (Linnaeus, 1758)										NT	DD
Rypticus randalli Courtenay, 1967	x	x			x			x		LC	LC
Rypticus saponaceus (Bloch & Schneider, 1801)							x		x	LC	LC
Serranus flaviventris (Cuvier, 1829)	x						x			LC	LC
Serranus phoebe Poey, 1851										LC	LC
Pomacanthidae											
Pomacanthus arcuatus (Linnaeus, 1758)										LC	DD
Pomacanthus paru (Bloch, 1787)					x				x	LC	DD
Chaetodontidae											
Chaetodon ocellatus (Bloch, 1787)					x					LC	DD
Chaetodon striatus Linnaeus, 1758	x				x		x			LC	LC

Haemulidae												
Anisotremus surinamensis (Bloch, 1791)	x										DD	DD
Anisotremus virginicus (Linnaeus, 1758)	x				x						LC	LC
Conodon nobilis (Linnaeus, 1758)	x				x				x		LC	LC
Genyatremus luteus (Bloch, 1790)					x				x		NE	LC
Haemulon aurolineatum Cuvier, 1830					x			x		x	LC	LC
Haemulon parra (Desmarest, 1823)	x				x			x			LC	LC
Haemulon plumierii (Lacepède, 1801)	x							x			LC	DD
Haemulon squamipinna Rocha & Rosa, 1999											NE	LC
Haemulon steindachneri (Jordan & Gilbert, 1882)	x					x				x	LC	LC
Orthopristis ruber (Cuvier, 1830)					x						LC	LC
Pomadasys corvinaeformis (Steindachner, 1868)	x		x		x	x			x	x	LC	LC
Pomadasys crocro (Cuvier, 1830)					x	x			x	x	DD	LC
Pomadasys ramosus Poey, 1860						x					NE	LC
Lutjanidae												
Lutjanus alexandrei Moura & Linderman, 2007	x				x	x		x	x	x	NE	LC
Lutjanus analis (Cuvier, 1828)	x			x	x			x			NT	NT
Lutjanus apodus (Walbaum, 1792)	x				x	x					LC	NE
Lutjanus cyanopterus (Cuvier, 1828)	x	x				x		x	x	x	VU	VU
Lutjanus griseus (Linnaeus, 1758)					x	x					LC	NE
Lutjanus jocu (Bloch & Schneider, 1801)	x	x			x	x		x	x	x	DD	NT
Lutjanus synagris (Linnaeus, 1758)	x			x	x	x		x			NT	NT
Ocyurus chrysurus (Bloch, 1791)	x				x			x			DD	NT
Polynemidae												
Polydactylus oligodon (Gunther, 1860)											LC	LC
Polydactylus virginicus (Linnaeus, 1758)	x	x	x		x			x	x	x	LC	LC
SCORPAENIFORMES												
Scorpaenidae												

Scorpaena isthmensis Meek & Hilderbrand, 1928										LC	LC
Scorpaena plumieri Bloch, 1789	x				x		x			LC	LC
Triglidae											
Prionotus punctatus (Bloch, 1793)	x				x	x	x			LC	LC
MORONIFORMES											
Ephippidae											
Chaetodipterus faber (Broussonet, 1782)	x	x	x	x	x	x	x	x	x	LC	LC
ACANTHURIFORMES											
Sciaenidae											
Bairdiella ronchus (Cuvier, 1830)	x	x			x	x	x	x	x	LC	LC
Cynoscion acoupa (Lacepède, 1801)	x				x			x		LC	NT
Cynoscion jamaicensis (Vaillant & Bocourt, 1833)										LC	LC
Cynoscion leiarchus (Cuvier, 1830)	x				x					LC	LC
Cynoscion microlepidotus (Cuvier, 1830)	x									LC	LC
Cynoscion steindachneri (Jordan, 1889)										LC	LC
Cynoscion virescens (Cuvier, 1830)					x					LC	LC
Isopisthus parvipinnis (Cuvier, 1830)		x			x			x		LC	LC
Larimus breviceps Cuvier, 1830	x	x								LC	LC
Macrodon ancylodon (Bloch & Schneider, 1801)					x					LC	LC
Menticirrhus americanus (Linnaeus, 1758)	x	x	x		x	x		x		LC	DD
Menticirrhus littoralis (Holbrook, 1847)	x		x							LC	DD
Micropogonias furnieri (Desmarest, 1823)	x	x			x			x		LC	LC
Nebris microps Cuvier, 1830	x	x								LC	LC
Odontoscion dentex (Cuvier, 1830)										LC	LC
Ophioscion punctatissimus Meek & Hildebrand, 1925	x	x						x		LC	DD
Paralonchurus brasiliensis (Steindachner, 1875)										LC	LC
Pareques acuminatus (Bloch & Schneider, 1801)	x									LC	DD
Pogonias cromis (Linnaeus, 1766)	x									LC	EN

	Stellifer brasiliensis (Schultz, 1945)	x	x	x					NE	LC
	Stellifer microps (Steindachner, 1864)			x			x		LC	LC
	Stellifer naso (Jordan, 1889)								LC	LC
	Stellifer rastrifer (Jordan, 1889)	x		x			x		LC	LC
	Stellifer stellifer (Bloch, 1790)			x					DD	LC
	Umbrina coroides Cuvier, 1830								LC	LC
	Acanthuridae									
	Acanthurus bahianus Castelnau, 1855	x		x		x		x	LC	LC
	Acanthurus chirurgus (Bloch, 1787)	x		x		x			LC	LC
	Acanthurus coeruleus Bloch & Schneider, 1801	x							LC	LC
SPARIFORMES										
	Lobotidae									
	Lobotes surinamensis (Bloch, 1790)			x					LC	LC
	Sparidae									
	Archosargus probatocephalus (Walbaum, 1792)		x	x					LC	DD
	Archosargus rhomboidalis (Linnaeus, 1758)	x		x	x	x	x	x	LC	LC
LOPHIIFORMES										
	Antennariidae									
	Antennarius multiocellatus (Valenciennes, 1837)								LC	DD
	Antennarius striatus (Shaw, 1794)			x				x	LC	DD
	Ogcocephalidae									
	Ogcocephalus vespertilio (Linnaeus, 1758)	x		x					NE	LC
TETRAODONTIFORMES										
	Ostraciidae									
	Acanthostracion quadricornis (Linnaeus, 1758)								LC	LC
	Lactophrys trigonus (Linnaeus, 1758)			x					LC	LC
	Lactophrys triqueter (Linnaeus, 1758)			x					LC	NE
	Balistidae									

Balistes vetula Linnaeus, 1758									x	NT	NT
Melichthys niger (Bloch, 1786)										LC	LC
Monacanthidae											
Aluterus heudelotii Hollard, 1855										LC	LC
Aluterus monoceros (Linnaeus, 1758)										LC	NT
Aluterus schoepfii (Walbaum, 1792)					x					LC	LC
Cantherhines pullus (Ranzani, 1842)					x					LC	LC
Monacanthus ciliatus (Mitchill, 1818)										LC	LC
Stephanolepis hispidus (Linnaeus, 1766)										LC	LC
Stephanolepis setifer (Bennett, 1831)										LC	LC
Tetraodontidae											
Canthigaster figueiredoi Moura & Castro, 2002					x					LC	LC
Colomesus psittacus (Bloch & Schneider, 1801)	x		x		x	x				LC	LC
Lagocephalus laevigatus (Linnaeus, 1766)	x				x	x	x	x		LC	LC
Sphoeroides greeleyi Gilbert, 1900	x			x	x	x	x	x	x	LC	LC
Sphoeroides nephelus (Goode & Bean, 1882)										LC	NE
Sphoeroides spengleri (Bloch, 1785)				x	x		x		x	LC	LC
Sphoeroides testudineus (Linnaeus, 1758)	x	x		x	x	x	x	x	x	LC	DD
Sphoeroides tyleri Shipp, 1972										LC	LC
Diodontidae											
Chilomycterus antillarum Jordan & Rutter, 1897	x						x			LC	LC
Chilomycterus spinosus spinosus (Linnaeus, 1758)					x	x				LC	LC
Diodon holocanthus Linnaeus, 1758					x					LC	LC
Diodon hystrix Linnaeus, 1758					x					LC	LC

Table V: List of fish species recorded in 45 estuaries in north-eastern Brazil, along with their conservation status (ICMbio and IUCN list). Estuaries: Formoso River, Santo Antônio River, Mundaú River – AL, São Francisco River, Japaratuba, Paraguaçu River, Contas River, Itaparica Island and Joanes River. ICMbio and IUCN classification: endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE).

Species	Formoso River-PE	Santo Antônio River-AL	Mundaú River-AL	São Francisco River-SE	Japaratuba-SE	Paraguaçu River-BA	Contas River-BA	Itaparica Island-BA	Joanes River-BA	IUCN	ICMBIO
ORECTOLOBIFORMES											
Ginglymostomatidae											
Ginglymostoma cirratum (Bonnaterre, 1788)										VU	VU
CARCHARHINIFORMES											
Carcharhinidae											
Carcharhinus leucas (Muller & Henle, 1839)										NT	NT
Carcharhinus limbatus (Muller & Henle, 1839)										NT	NT
Carcharhinus porosus (Ranzani, 1839)										CR	CR
Isogomphodon oxyrhynchus (Muller & Henle, 1839)										CR	CR
Rhizoprionodon lalandii (Muller & Henle, 1839)										VU	NT
Rhizoprionodon porosus (Poey, 1861)						x				VU	DD
Sphyrnidae											
Sphyrna lewini (Griffith & Smith, 1834)										CR	CR
Sphyrna tiburo (Linnaeus, 1758)										EN	CR
Sphyrna tudes (Valenciennes, 1822)										CR	CR
TORPEDINIFORMES											
Narcinidae											
Narcine brasiliensis (Olfers, 1831)						x		x		NT	DD
PRISTIFORMES											
Pristidae											

Pristis pristis Muller & Henle, 1841						CR	CR
Rhinobatidae							
Pseudobatos percellens (Walbaum, 1792)					x	EN	DD
MYLIOBATIFORMES							
Dasyatidae							
Fontitrygon geijskesi (Boeseman, 1948)						CR	DD
Hypanus americanus (Hildebrand & Schroeder, 1928)	x				x	NT	DD
Hypanus guttatus (Bloch & Schneider, 1801)	x				x	NT	LC
Hypanus marianae (Gomes, Rosa & Gadig, 2000)						EN	DD
Hypanus say (Lesueur, 1817)						NT	DD
Gymnuridae							
Gymnura micrura (Bloch & Scheneider, 1801)					x	NT	NT
Myliobatidae							
Aetobatus narinari (Euphrasen, 1790)						EN	DD
Mobula hypostoma (Bancroft, 1831)						EN	VU
Rhinoptera bonasus (Mitchill, 1815)					x	VU	DD
ELOPIFORMES							
Elopidae							
Elops saurus Linnaeus, 1766	x		x	x		LC	NE
Megalopidae							
Megalops atlanticus Valenciennes, 1847	x			x		VU	VU
ALBULIFORMES							
Albulidae							
Albula vulpes (Linnaeus, 1758)	x	x	x		x	NT	DD
ANGUILLIFORMES							
Muraenidae							
Gymnothorax funebris Ranzani, 1839	x					LC	DD
Gymnothorax moringa (Cuvier, 1829)				x	x	LC	DD

	Gymnothorax ocellatus Agassiz, 1831	x				x		x			LC	DD
	Gymnothorax vicinus (Castelnau, 1855)										LC	DD
	Ophichthidae											
	Ahlia egmontis (Jordan, 1884)										LC	LC
	Myrichthys breviceps (Richardson, 1848)										LC	LC
	Myrichthys ocellatus (Lesueur, 1825)						x				LC	LC
	Myrophis punctatus Lütken, 1852										LC	LC
	Ophichthus cylindroideus (Ranzani, 1839)										LC	LC
	Ophichthus ophis (Linnaeus, 1758)							x			LC	LC
	Muraenesocidae											
	Cynoponticus savanna (Bancroft, 1831)										LC	LC
	Congridae											
	Ariosoma balearicum (Delaroche, 1809)										LC	LC
CLUPEIFORMES												
	Pristigasteridae											
	Chirocentrodon bleekerianus (Poey, 1867)										LC	LC
	Odontognathus mucronatus Lacepède, 1800										LC	LC
	Pellona flavipinnis (Valenciennes,1837)										LC	LC
	Pellona harroweri (Fowler, 1917)					x					LC	LC
	Engraulidae											
	Anchoa filifera (Fowler, 1915)									x	LC	LC
	Anchoa hepsetus (Linnaeus, 1758)										LC	NE
	Anchoa januaria (Steindachner, 1879)					x					LC	LC
	Anchoa lyolepis (Evermann & Marsh, 1900)					x					LC	LC
	Anchoa parva (Meek & Hildebrand, 1923)										LC	NE
	Anchoa spinifer (Valenciennes, 1848)					x					LC	LC
	Anchoa tricolor (Spix & Agassiz, 1829)	x	x								LC	LC
	Anchovia clupeoides (Swainson, 1839)	x	x	x		x	x			x	LC	LC

	Anchoviella lepidentostole (Fowler, 1911)					x			x	LC	LC
	Cetengraulis edentulus (Cuvier, 1829)	x		x	x		x			LC	LC
	Engraulis anchoita Hubbs & Marini 1935									LC	LC
	Lycengraulis batesii (Gunther, 1868)									LC	LC
	Lycengraulis grossidens (Spix & Agassiz, 1829)	x				x	x	x	x	LC	LC
	Pterengraulis atherinoides (Linnaeus, 1766)									LC	LC
	Clupeidae										
	Harengula clupeola (Cuvier, 1829)	x	x			x	x			LC	LC
	Harengula jaguana Poey, 1865								x	LC	LC
	Lile piquitinga (Schreiner & Miranda Ribeiro, 1903)	x					x		x	LC	LC
	Opisthonema oglinum (Lesueur, 1818)	x	x				x		x	LC	LC
	Platanichthys platana (Regan, 1917)	x								LC	LC
	Rhinosardinia amazonica (Steindachner, 1879)									LC	LC
	Rhinosardinia bahiensis (Steindachner, 1879)									LC	LC
CHARACIFORMES											
	Erythrinidae										
	Hoplias malabaricus (Bloch, 1794)									LC	LC
	Prochilodus argenteus Spix & Agassiz, 1829					x				NE	LC
	Serrasalmidae										
	Pygocentrus nattereri Kner, 1858									NE	LC
	Serrasalmus rhombeus (Linnaeus, 1766)									NE	LC
	Serrasalmus spilopleura Kner, 1858									NE	LC
	Anostomidae										
	Schizodon fasciatus Spix & Agassiz, 1829									NE	LC
	Leporinus friderici (Bloch, 1794)									NE	LC
	Curimatidae										
	Steindachnerina elegans (Steindachner, 1875)									NE	LC
	Characidae										

Astyanax bimaculatus (Linnaeus, 1758)							NE	LC
Hemigrammus marginatus Ellis, 1911							NE	LC
SILURIFORMES								
Loricariidae								
Hypostomus plecostomus (Linnaeus, 1758)							NE	NE
Loricaria parnahybae Steindachner, 1907							NE	LC
Ariidae								
Aspistor luniscutis (Valenciennes, 1840)							NE	LC
Aspistor quadriscutis (Valenciennes, 1840)							LC	LC
Bagre bagre (Linnaeus, 1766)					x		LC	NT
Bagre marinus (Mitchill, 1815)							LC	DD
Cathorops agassizii (Eigenmann & Eigenmann, 1888)	x						NE	LC
Cathorops spixii (Agassiz, 1829)		x					NE	LC
Genidens genidens (Cuvier, 1829)							LC	LC
Notarius grandicassis (Valenciennes, 1840)			x				LC	LC
Sciades couma (Valenciennes, 1840)					x	x	LC	DD
Sciades herzbergii (Bloch, 1794)	x	x				x	LC	LC
Sciades parkeri (Traill, 1832)							VU	VU
Sciades proops (Valenciennes, 1840)	x						NE	DD
Aspredinidae								
Aspredo aspredo (Linnaeus, 1758)							LC	LC
Aspredinichthys tibicen (Valenciennes, 1840)							LC	LC
Auchenipteridae								
Ageneiosus inermis (Linnaeus, 1766)							NE	LC
Pseudauchenipterus nodosus (Bloch, 1794)							NE	LC
Trachelyopterus galeatus (Linnaeus, 1766)							NE	LC
Heptapteridae								
Pimelodella cristata (Muller & Troschel, 1849)							LC	LC

Pimelodella lateristriga (Lichtenstein, 1823)							NE	DD
Pimelodidae								
Brachyplatystoma vaillantii (Valenciennes, 1840)							NE	LC
Pseudoplatystoma fasciatum (Linnaeus, 1766)							NE	NE
Sorubim lima (Bloch & Schneider, 1801)							NE	LC
AULOPIFORMES								
Synodontidae								
Synodus foetens (Linnaeus, 1766)	x			x	x		LC	LC
Synodus poeyi Jordan, 1887							LC	LC
Trachinocephalus myops (Forster, 1801)					x		LC	LC
HOLOCENTRIFORMES								
Holocentridae								
Holocentrus adscensionis (Osbeck, 1765)							LC	LC
BATRACHOIDIFORMES								
Batrachoididae								
Amphichthys cryptocentrus (Valenciennes, 1837)				x			LC	LC
Batrachoides surinamensis (Bloch & Schneider, 1801)							LC	LC
Thalassophryne nattereri Steindachner, 1876	x		x	x		x	LC	LC
Thalassophryne punctata Steindachner, 1876						x	NE	LC
KURTIFORMES								
Apogonidae								
Phaeoptyx pigmentaria (Poey, 1860)							LC	LC
GOBIIFORMES								
Eleotridae								
Dormitator maculatus (Bloch, 1792)	x						LC	NT
Eleotris pisonis (Gmelin, 1789)	x					x	LC	LC
Erotelis smaragdus (Valenciennes, 1837)							LC	LC
Guavina guavina (Valenciennes, 1837)	x						LC	LC

	Gobiidae										
	Awaous tajasica (Lichtenstein, 1822)									LC	LC
	Bathygobius mystacium Ginsburg, 1947									LC	NE
	Bathygobius soporator (Valenciennes, 1837)	x	x				x	x	x	LC	LC
	Coryphopterus glaucofraenum Gill, 1863									LC	LC
	Ctenogobius boleosoma (Jordan & Gilbert, 1882)						x	x	x	LC	LC
	Ctenogobius saepepallens (Gilbert & Randall, 1968)									LC	LC
	Ctenogobius shufeldti (Jordan & Eigenmann, 1887)									LC	LC
	Ctenogobius smaragdus (Valenciennes, 1837)	x					x	x		LC	LC
	Ctenogobius stigmaticus (Poey, 1860)						x	x		LC	LC
	Evorthodus lyricus (Girard, 1858)									LC	LC
	Gobioides broussonnetii Lacepède, 1800			x						LC	LC
	Gobionellus oceanicus (Pallas, 1770)	x				x	x		x	LC	LC
	Gobionellus stomatus Starks, 1913	x					x	x	x	NE	LC
	Microdesmus bahianus Dawson, 1973	x								LC	LC
	Microdesmus longipinnis (Weymouth, 1910)	x								LC	LC
	Microgobius meeki Evermann & Marsh, 1899						x			LC	LC
	Pomacentridae										
	Abudefduf saxatilis (Linnaeus, 1758)							x		LC	LC
	Stegastes fuscus (Cuvier, 1830)	x								LC	LC
	Stegastes variabilis (Castelnau, 1855)							x		NE	LC
	Opistognathidae										
	Opistognathus cuvierii Valenciennes, 1836						x			NE	LC
MUGILIFORMES											
	Mugilidae										
	Mugil brevirostris (Ribeiro, 1915)		x							NE	NE
	Mugil curema Valenciennes, 1836	x	x	x		x	x	x		LC	DD
	Mugil curvidens Valenciennes, 1836	x	x	x	x			x	x	LC	DD

Mugil incilis Hancock, 1830				x				x	LC	LC
Mugil liza Valenciennes, 1836	x		x	x	x				DD	NT
Mugil rubrioculus Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007	x		x						LC	DD
CICHLIFORMES										
Cichlidae										
Cichla ocellaris Bloch & Schneider, 1801									NE	LC
Oreochromis niloticus (Linnaeus, 1758)									LC	NE
BLENNIIFORMES										
Dactyloscopidae										
Dactyloscopus crossotus Starks, 1913									LC	LC
Blenniidae										
Scartella cristata (Linnaeus, 1758)									LC	LC
Labrisomidae										
Labrisomus nuchipinnis (Quoy & Gaimard, 1824)									LC	LC
ATHERINIFORMES										
Atherinidae										
Atherinella brasiliensis (Quoy & Gaimard, 1825)	x	x			x		x	x	LC	LC
Atherinella cf. blackburni (Schultz, 1949)									LC	LC
Odontesthes bonariensis (Valenciennes, 1835)	x								NE	DD
BELONIFORMES										
Exocoetidae										
Cheilopogon melanurus (Valenciennes, 1847)									LC	LC
Hirundichthys affinis (Gunther, 1866)	x								LC	LC
Hemiramphidae										
Hemiramphus balao Lesueur, 1821	x								LC	DD
Hemiramphus brasiliensis (Linnaeus, 1758)		x							LC	LC
Hyporhamphus roberti roberti (Valenciennes, 1847)	x								LC	LC
Hyporhamphus unifasciatus (Ranzani, 1841)	x				x		x		LC	NT

Belonidae												
Ablennes hians (Valenciennes, 1846)											LC	LC
Strongylura marina (Walbaum, 1792)		x	x			x					LC	LC
Strongylura timucu (Walbaum, 1792)	x					x		x			LC	LC
Tylosurus acus acus (Lacepède, 1803)	x	x									LC	LC
Tylosurus crocodilus crocodilus (Péron & Lesueur, 1821)											LC	LC
CYPRINODONTIFORMES												
Poeciliidae												
Poecilia vivipara Bloch & Schneider, 1801	x							x	x		NE	LC
CARANGIFORMES												
Rachycentridae												
Rachycentron canadum (Linnaeus, 1766)											LC	LC
Echeneidae												
Echeneis naucrates Linnaeus, 1758	x										LC	LC
Phtheirichthys lineatus (Menzies, 1791)	x										LC	LC
Remora remora (Linnaeus, 1758)											LC	LC
Carangidae												
Carangoides bartholomaei (Cuvier, 1833)	x		x			x					LC	LC
Caranx crysos (Mitchill, 1815)	x	x	x		x	x					LC	LC
Caranx hippos (Linnaeus, 1766)	x		x		x	x	x				LC	LC
Caranx latus Agassiz, 1831	x	x	x	x	x	x		x	x		LC	LC
Chloroscombrus chrysurus (Linnaeus, 1766)	x					x		x			LC	LC
Hemicaranx amblyrhynchus (Cuvier, 1833)											LC	LC
Oligoplites palometa (Cuvier, 1832)	x		x		x	x					LC	LC
Oligoplites saliens (Bloch, 1793)	x			x	x	x					LC	LC
Oligoplites saurus (Bloch & Schneider, 1801)	x	x	x			x		x			LC	LC
Selene brownii (Curvier, 1816)	x										LC	LC
Selene setapinnis (Mitchill, 1815)		x				x					LC	LC

Selene vomer (Linnaeus, 1758)	x	x	x			x	x	x		LC	LC
Trachinotus carolinus (Linnaeus, 1766)	x							x		LC	LC
Trachinotus cayennensis Cuvier, 1832										LC	DD
Trachinotus falcatus (Linnaeus, 1758)	x		x			x				LC	LC
Trachinotus goodei Jordan & Evermann, 1896			x							LC	LC
ISTIOPHORIFORMES											
Sphyraenidae											
Sphyraena barracuda (Edwards, 1771)	x	x				x		x	x	LC	LC
Sphyraena guachancho Cuvier, 1829	x					x			x	LC	LC
PLEURONECTIFORMES											
Paralichthyidae											
Citharichthys arenaceus Evermann & Marsh, 1900	x		x		x		x			LC	LC
Citharichthys cornutus (Günther, 1880)										LC	LC
Citharichthys macrops Dresel, 1885							x		x	LC	LC
Citharichthys spilopterus Günther, 1862	x			x		x	x	x	x	LC	LC
Etropus crossotus Jordan & Gilbert, 1882	x					x			x	LC	LC
Etropus longimanus Norman, 1933										NE	LC
Paralichthys brasiliensis (Ranzani, 1842)	x					x	x	x	x	NE	LC
Paralichthys orbignyanus (Valenciennes, 1839)							x			DD	DD
Paralichthys tropicus Ginsburg, 1933		x				x				DD	NE
Syacium micrurum Ranzani, 1842						x	x			LC	LC
Syacium papillosum (Linnaeus, 1758)								x		LC	LC
Bothidae											
Bothus lunatus (Linnaeus, 1758)										LC	LC
Bothus ocellatus (Agassiz, 1831)	x									LC	LC
Bothus robinsi Topp & Hoff, 1972										LC	LC
Achiridae											
Achirus achirus (Linnaeus, 1758)	x								x	LC	LC

	Achirus declivis Chabanaud, 1940	x		x	x	x				LC	LC
	Achirus lineatus (Linnaeus, 1758)	x		x		x	x		x	LC	LC
	Achirus mucuri Ramos, Ramos & Lopes, 2009									NE	VU
	Trinectes microphthalmus (Chabanaud, 1928)					x				LC	LC
	Trinectes paulistanus (Miranda Ribeiro, 1915)					x	x		x	LC	LC
	Cynoglossidae					x					
	Symphurus diomedeanus (Goode & Bean, 1885)	x				x			x	LC	LC
	Symphurus plagusia (Bloch & Schneider, 1801)	x		x					x	LC	LC
	Symphurus tessellatus (Quoy & Gaimard, 1824)									LC	LC
SYNGNATHIFORMES											
	Syngnathidae										
	Bryx dunckeri (Metzelaar, 1919)									LC	LC
	Cosmocampus elucens (Poey, 1868)									LC	LC
	Hippocampus erectus Perry, 1810	x								VU	VU
	Hippocampus reidi Ginsburg, 1933	x				x		x		NT	VU
	Microphis brachyurus lineatus (Kaup, 1856)									NE	NE
	Microphis brachyurus brachyurus (Bleeker, 1854)									LC	LC
	Fistulariidae										
	Fistularia petimba Lacepède, 1803	x								LC	LC
	Fistularia tabacaria Linnaeus, 1758					x		x	x	LC	LC
	Syngnathus pelagicus Linnaeus, 1758							x		LC	LC
	Dactylopteridae										
	Dactylopterus volitans (Linnaeus, 1758)	x				x		x		LC	LC
SCOMBRIFORMES											
	Trichiuridae										
	Trichiurus lepturus Linnaeus, 1758	x				x				LC	LC
	Scombridae										
	Euthynnus alletteratus (Rafinesque, 1810)									LC	LC

Scomberomorus brasiliensis Collette, Russo & Zavala-Camin, 1978	x					x		x		LC	LC
Scomberomorus cavalla (Cuvier, 1829)	x		x							LC	LC
Scomberomorus maculatus (Mitchill, 1815)										LC	NE
Scomberomorus regalis (Bloch, 1793)	x									LC	LC
Stromateidae											
Peprilus paru (Linnaeus, 1758)										LC	LC
TRACHINIFORMES											
Uranoscopidae											
Astroscopus y-graecum Cuvier, 1829										LC	LC
LABRIFORMES											
Labridae											
Halichoeres poeyi (Steindachner, 1867)										LC	LC
Scaridae											
Nicholsina usta (Valenciennes, 1840)										LC	LC
Sparisoma amplum (Ranzani, 1842)	x									LC	NT
Sparisoma axillare (Steindachner, 1878)	x									DD	VU
Sparisoma radians (Valenciennes, 1840)	x									LC	LC
PERCIFORMES											
Centropomidae											
Centropomus ensiferus Poey, 1860			x	x						LC	LC
Centropomus mexicanus Bocourt, 1868	x									LC	LC
Centropomus parallelus Poey, 1860	x	x	x	x		x	x	x	x	LC	LC
Centropomus pectinatus Poey, 1860	x									LC	LC
Centropomus undecimalis (Bloch, 1792)	x	x	x	x	x	x		x		LC	LC
Gerreidae											
Diapterus auratus Ranzani, 1842	x	x	x			x	x		x	LC	LC
Diapterus rhombeus (Cuvier, 1829)	x	x	x	x	x	x	x	x	x	LC	LC

Eucinostomus argenteus Baird & Girard, 1855	x	x	x	x	x	x		x	x	LC	LC
Eucinostomus gula (Quoy & Gaimard, 1824)	x	x				x		x	x	LC	LC
Eucinostomus havana (Nichols, 1912)										LC	LC
Eucinostomus melanopterus (Bleeker, 1863)	x	x		x		x			x	LC	LC
Eugerres brasilianus (Cuvier, 1830)	x				x	x				LC	LC
Gerres cinereus (Walbaum, 1792)	x					x				LC	LC
Ulaema lefroyi (Goode, 1874)	x									LC	LC
Mullidae											
Pseudupeneus maculatus (Bloch, 1793)	x					x		x		LC	LC
Serranidae											
Alphestes afer (Bloch, 1793)	x									LC	DD
Diplectrum radiale (Quoy & Gaimard, 1824)						x		x		LC	LC
Epinephelus adscensionis (Osbeck, 1765)	x									LC	DD
Epinephelus itajara (Lichtenstein, 1822)	x							x		VU	CR
Hyporthodus nigritus (Holbrook, 1855)										NT	EN
Mycteroperca bonaci (Poey, 1860)	x							x		NT	VU
Mycteroperca tigris (Valenciennes, 1833)										DD	DD
Mycteroperca venenosa (Linnaeus, 1758)										NT	DD
Rypticus randalli Courtenay, 1967	x		x			x	x			LC	LC
Rypticus saponaceus (Bloch & Schneider, 1801)	x							x		LC	LC
Serranus flaviventris (Cuvier, 1829)						x		x		LC	LC
Serranus phoebe Poey, 1851										LC	LC
Pomacanthidae											
Pomacanthus arcuatus (Linnaeus, 1758)	x									LC	DD
Pomacanthus paru (Bloch, 1787)								x		LC	DD
Chaetodontidae											
Chaetodon ocellatus (Bloch, 1787)										LC	DD
Chaetodon striatus Linnaeus, 1758								x		LC	LC

Haemulidae												
Anisotremus surinamensis (Bloch, 1791)						x				DD	DD
Anisotremus virginicus (Linnaeus, 1758)						x				LC	LC
Conodon nobilis (Linnaeus, 1758)		x								LC	LC
Genyatremus luteus (Bloch, 1790)	x					x				NE	LC
Haemulon aurolineatum Cuvier, 1830										LC	LC
Haemulon parra (Desmarest, 1823)	x					x				LC	LC
Haemulon plumierii (Lacepède, 1801)		x								LC	DD
Haemulon squamipinna Rocha & Rosa, 1999						x				NE	LC
Haemulon steindachneri (Jordan & Gilbert, 1882)						x		x		LC	LC
Orthopristis ruber (Cuvier, 1830)										LC	LC
Pomadasys corvinaeformis (Steindachner, 1868)	x	x				x				LC	LC
Pomadasys crocro (Cuvier, 1830)	x							x	x	DD	LC
Pomadasys ramosus Poey, 1860										NE	LC
Lutjanidae											
Lutjanus alexandrei Moura & Linderman, 2007	x					x			x	NE	LC
Lutjanus analis (Cuvier, 1828)	x		x					x		NT	NT
Lutjanus apodus (Walbaum, 1792)		x								LC	NE
Lutjanus cyanopterus (Cuvier, 1828)	x									VU	VU
Lutjanus griseus (Linnaeus, 1758)	x	x						x		LC	NE
Lutjanus jocu (Bloch & Schneider, 1801)	x	x		x	x	x		x	x	DD	NT
Lutjanus synagris (Linnaeus, 1758)	x					x		x	x	NT	NT
Ocyurus chrysurus (Bloch, 1791)	x							x		DD	NT
Polynemidae											
Polydactylus oligodon (Gunther, 1860)										LC	LC
Polydactylus virginicus (Linnaeus, 1758)	x		x		x	x	x	x	x	LC	LC
SCORPAENIFORMES											
Scorpaenidae											

Scorpaena isthmensis Meek & Hilderbrand, 1928	x									LC	LC
Scorpaena plumieri Bloch, 1789	x					x		x	x	LC	LC
Triglidae											
Prionotus punctatus (Bloch, 1793)	x					x		x		LC	LC
MORONIFORMES											
Ephippidae											
Chaetodipterus faber (Broussonet, 1782)	x		x			x	x	x		LC	LC
ACANTHURIFORMES											
Sciaenidae											
Bairdiella ronchus (Cuvier, 1830)	x	x	x	x						LC	LC
Cynoscion acoupa (Lacepède, 1801)		x				x				LC	NT
Cynoscion jamaicensis (Vaillant & Bocourt, 1833)		x				x				LC	LC
Cynoscion leiarchus (Cuvier, 1830)	x					x	x			LC	LC
Cynoscion microlepidotus (Cuvier, 1830)		x				x	x			LC	LC
Cynoscion steindachneri (Jordan, 1889)										LC	LC
Cynoscion virescens (Cuvier, 1830)										LC	LC
Isopisthus parvipinnis (Cuvier, 1830)	x					x				LC	LC
Larimus breviceps Cuvier, 1830						x				LC	LC
Macrodon ancylodon (Bloch & Schneider, 1801)		x				x				LC	LC
Menticirrhus americanus (Linnaeus, 1758)	x					x				LC	DD
Menticirrhus littoralis (Holbrook, 1847)								x		LC	DD
Micropogonias furnieri (Desmarest, 1823)	x	x				x	x			LC	LC
Nebris microps Cuvier, 1830										LC	LC
Odontoscion dentex (Cuvier, 1830)				x						LC	LC
Ophioscion punctatissimus Meek & Hildebrand, 1925										LC	DD
Paralonchurus brasiliensis (Steindachner, 1875)										LC	LC
Pareques acuminatus (Bloch & Schneider, 1801)										LC	DD
Pogonias cromis (Linnaeus, 1766)										LC	EN

	Stellifer brasiliensis (Schultz, 1945)	x						NE	LC
	Stellifer microps (Steindachner, 1864)							LC	LC
	Stellifer naso (Jordan, 1889)							LC	LC
	Stellifer rastrifer (Jordan, 1889)	x			x			LC	LC
	Stellifer stellifer (Bloch, 1790)				x	x		DD	LC
	Umbrina coroides Cuvier, 1830							LC	LC
	Acanthuridae								
	Acanthurus bahianus Castelnau, 1855				x			LC	LC
	Acanthurus chirurgus (Bloch, 1787)	x				x		LC	LC
	Acanthurus coeruleus Bloch & Schneider, 1801							LC	LC
SPARIFORMES									
	Lobotidae								
	Lobotes surinamensis (Bloch, 1790)	x			x			LC	LC
	Sparidae								
	Archosargus probatocephalus (Walbaum, 1792)	x						LC	DD
	Archosargus rhomboidalis (Linnaeus, 1758)	x	x		x			LC	LC
LOPHIIFORMES									
	Antennariidae								
	Antennarius multiocellatus (Valenciennes, 1837)						x	LC	DD
	Antennarius striatus (Shaw, 1794)	x				x	x	LC	DD
	Ogcocephalidae								
	Ogcocephalus vespertilio (Linnaeus, 1758)	x			x	x		NE	LC
TETRAODONTIFORMES									
	Ostraciidae								
	Acanthostracion quadricornis (Linnaeus, 1758)				x	x		LC	LC
	Lactophrys trigonus (Linnaeus, 1758)	x				x		LC	LC
	Lactophrys triqueter (Linnaeus, 1758)	x						LC	NE
	Balistidae								

Balistes vetula Linnaeus, 1758								x		NT	NT
Melichthys niger (Bloch, 1786)										LC	LC
Monacanthidae											
Aluterus heudelotii Hollard, 1855					x					LC	LC
Aluterus monoceros (Linnaeus, 1758)										LC	NT
Aluterus schoepfii (Walbaum, 1792)										LC	LC
Cantherhines pullus (Ranzani, 1842)										LC	LC
Monacanthus ciliatus (Mitchill, 1818)										LC	LC
Stephanolepis hispidus (Linnaeus, 1766)								x		LC	LC
Stephanolepis setifer (Bennett, 1831)					x					LC	LC
Tetraodontidae											
Canthigaster figueiredoi Moura & Castro, 2002										LC	LC
Colomesus psittacus (Bloch & Schneider, 1801)				x						LC	LC
Lagocephalus laevigatus (Linnaeus, 1766)	x		x			x	x			LC	LC
Sphoeroides greeleyi Gilbert, 1900	x				x	x	x		x	LC	LC
Sphoeroides nephelus (Goode & Bean, 1882)	x									LC	NE
Sphoeroides spengleri (Bloch, 1785)	x				x		x			LC	LC
Sphoeroides testudineus (Linnaeus, 1758)	x	x	x		x	x	x		x	LC	DD
Sphoeroides tyleri Shipp, 1972										LC	LC
Diodontidae											
Chilomycterus antillarum Jordan & Rutter, 1897	x				x	x				LC	LC
Chilomycterus spinosus spinosus (Linnaeus, 1758)							x		x	LC	LC
Diodon holocanthus Linnaeus, 1758										LC	LC
Diodon hystrix Linnaeus, 1758										LC	LC

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Supplementary Material

Table I: Classification of feeding mode functional group (FMFG): zoobenthivore (ZB), piscivore (PV), zooplanktivore (ZP), herbivore (HV), omnivore (OV), detritivore (DV) and opportunistic (OP); estuarine use functional group (EUFG): marine migrant (MM), marine stragglers (MS), estuarine fishes (ES), anadromous species (AN), amphidromous (AM), catadromous (CA), freshwater migrants (FM) and freshwater species (FS), for species observed during the study and references used for each category.

Species	FMFG	REF	EUFG	REF
***Ginglymostoma cirratum* (Bonnaterre, 1788)**	PV	Compagno, 2001	MM	Compagno, 2001
***Carcharhinus leucas* (Muller & Henle, 1839)**	PV	WoRMS 2020	MM	WoRMS 2020
***Carcharhinus limbatus* (Muller & Henle, 1839)**	PV	Castro 1996	MM	Castro, 1996
***Carcharhinus porosus* (Ranzani, 1839)**	PV	Ebert et al. 2013	MM	Ebert et al., 2013
***Isogomphodon oxyrhynchus* (Muller & Henle, 1839)**	PV	Compagno 1984	MM	Ebert et al., 2013
***Rhizoprionodon lalandii* (Muller & Henle, 1839)**	PV	Ferreira et al. 2019	MS	Ferreira et al., 2019
***Rhizoprionodon porosus* (Poey, 1861)**	PV	Ferreira et al., 2019	MS	Ferreira et al., 2019
***Sphyrna lewini* (Griffith & Smith, 1834)**	PV	Sommer et al. 1996	MM	Compagno, 1994
***Sphyrna tiburo* (Linnaeus, 1758)**	ZB	Alves and Filho 1996	MM	Ebert et al., 2013
***Sphyrna tudes* (Valenciennes, 1822)**	PV	Compagno, 1984	MM	Ebert et al., 2013
***Narcine brasiliensis* (Olfers, 1831)**	ZB	Michael 1993	MS	Reis-Filho et al. 2010
***Pristis pristis* Muller & Henle, 1841**	PV	Miller 2005	MM	Thorburn et al. 2007
***Pseudobatos percellens* (Walbaum, 1792)**	ZB	Passos et al. 2013	MS	Reis-Filho et al., 2010
***Fontitrygon geijskesi* (Boeseman, 1948)**	-	-	MM	Last et al. 2016
***Hypanus americanus* (Hildebrand & Schroeder, 1928)**	ZB	Lieske and Myers 1994	MS	Reis-Filho et al., 2010
***Hypanus guttatus* (Bloch & Schneider, 1801)**	ZB	Freitas et al. 2019	MS	Uyeno et al. 1983
***Hypanus marianae* (Gomes, Rosa & Gadig, 2000)**	ZB	Ferreira et al., 2019	MS	Ferreira et al., 2019
***Hypanus say* (Lesueur, 1817)**	ZB	Smith 1997	MS	Last et al., 2016
***Gymnura micrura* (Bloch & Scheneider, 1801)**	ZB	Lima et al. 2021	MS	Reis-Filho et al., 2010
***Aetobatus narinari* (Euphrasen, 1790)**	ZB	Last et al., 2016	MS	Ajemian et al. 2012
***Mobula hypostoma* (Bancroft, 1831)**	ZB	Michael, 1993	MS	Michael, 1993
***Rhinoptera bonasus* (Mitchill, 1815)**	ZB	Last et al., 2016	MS	Reis-Filho et al., 2010

***Elops saurus* Linnaeus, 1766**	PV	da Silva and Fabré 2019	MS	Vasconcelos Vasconcelos Filho and Oliveira 1999
***Megalops atlanticus* Valenciennes, 1847**	PV	Whitehead and Vergara 1978	MM	Whitehead and Vergara, 1978
***Albula vulpes* (Linnaeus, 1758)**	ZB	Passos et al., 2013	MM	Paiva et al. 2009
***Gymnothorax funebris* Ranzani, 1839**	ZB	Carvalho-Filho 1999	MS	Vasconcelos Filho & Oliveira, 1999
***Gymnothorax moringa* (Cuvier, 1829)**	ZB	Carvalho-Filho, 1999	MM	Reis-Filho et al., 2010
***Gymnothorax ocellatus* Agassiz, 1831**	ZB	Santos and Castro 2003	MS	Vasconcelos Filho and Oliveira 1999
***Gymnothorax vicinus* (Castelnau, 1855)**	OP	Miller 1987	MS	Claro 1994
***Ahlia egmontis* (Jordan, 1884)**	ZB	Pimentel, 2018	MS	Ross and Rohde 2003
***Myrichthys breviceps* (Richardson, 1848)**	ZB	Ross et al. 2007	MS	Robins and Ray 1986
***Myrichthys ocellatus* (Lesueur, 1825)**	ZB	Luiz et al. 2008	MS	Monteiro-Neto et al. 2013
***Myrophis punctatus* Lütken, 1852**	PV	Alves and Filho 1996	MM	Favero et al. 2019
***Ophichthus cylindroideus* (Ranzani, 1839)**	PV	Favero et al. 2019	MM	Favero et al. 2019
***Ophichthus ophis* (Linnaeus, 1758)**	PV	Randall 1967	MS	Schneider 1990
***Cynoponticus savanna* (Bancroft, 1831)**	ZB	Carpenter 2003	ES	Carpenter 2003
***Ariosoma balearicum* (Delaroche, 1809)**	-	-	MS	Miller 2002; Ross et al. 2007
***Chirocentrodon bleekerianus* (Poey, 1867)**	ZP	Passos et al. 2013	MS	Passos et al. 2013
***Odontognathus mucronatus* Lacepède, 1800**	HV	Passarone et al. 2019	MS	Passarone et al. 2019
***Pellona flavipinnis* (Valenciennes,1837)**	OV	di Dario 2013	FM	di Dario 2013
***Pellona harroweri* (Fowler, 1917)**	ZB	Passarone et al. 2019	MS	Passarone et al. 2019
***Anchoa filifera* (Fowler, 1915)**	ZB	Passarone et al. 2019	ES	Passarone et al. 2019
***Anchoa hepsetus* (Linnaeus, 1758)**	ZP	Nizinski and Munroe 2002	MM	Nizinski and Munroe 2002
***Anchoa januaria* (Steindachner, 1879)**	ZP	Lima et al. 2021	ES	Reis-Filho et al. 2010
***Anchoa lyolepis* (Evermann & Marsh, 1900)**	ZP	Passos et al. 2013	ES	Reis-Filho et al. 2010
***Anchoa parva* (Meek & Hildebrand, 1923)**	ZP	Cervigón 1993	MM	Cervigón 1993
***Anchoa spinifer* (Valenciennes, 1848)**	PV	Passarone et al. 2019	MM	Passarone et al. 2019

***Anchoa tricolor* (Spix & Agassiz, 1829)**	ZB	Ferreira et al. 2019	MM	Ferreira et al., 2019
***Anchovia clupeoides* (Swainson, 1839)**	ZP	Passarone et al. 2019	MM	Passarone et al. 2019
***Anchoviella lepidentostole* (Fowler, 1911)**	PV	Favero et al. 2019	MM	Favero et al. 2019
***Cetengraulis edentulus* (Cuvier, 1829)**	ZP	Passarone et al. 2019	MM	Passarone et al. 2019
***Engraulis anchoita* Hubbs & Marini 1935**	ZP	Vasconcellos et al. 1998	MS	Passos et al. 2013
***Lycengraulis batesii* (Gunther, 1868)**	PV	Tejerina-Garro and de Merona 2010	FM	Bornbusch 1988
***Lycengraulis grossidens* (Spix & Agassiz, 1829)**	PV	Passarone et al. 2019	ES	Passarone et al. 2019
***Pterengraulis atherinoides* (Linnaeus, 1766)**	PV	Krumme et al. 2005	MS	Krumme et al. 2004
***Harengula clupeola* (Cuvier, 1829)**	ZP	Paiva et al. 2008	MS	Vasconcelos Filho and Oliveira 1999
***Harengula jaguana* Poey, 1865**	ZP	Passos et al. 2013	MS	Peralta-Meixueiro and Vega-Cendejas 2011
***Lile piquitinga* (Schreiner & Miranda Ribeiro, 1903)**	ZP	Favero et al. 2019	ES	Reis-Filho et al. 2010
***Opisthonema oglinum* (Lesueur, 1818)**	ZP	Vasconcelos-Filho 1979	MS	Vasconcelos Filho and Oliveira 1999
***Platanichthys platana* (Regan, 1917)**	ZP	Passos et al. 2013	ES	Passos et al. 2013
***Rhinosardinia amazonica* (Steindachner, 1879)**	OV	Alves and Filho 1996	FM	Whitehead 1985
***Rhinosardinia bahiensis* (Steindachner, 1879)**	ZP	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Hoplias malabaricus* (Bloch, 1794)**	PV	Alves and Filho 1996	ES	Costa Novaes and Carvalho 2011
***Prochilodus argenteus* Spix & Agassiz, 1829**	HV	Alves and Filho 1996	FM	Melo 2011
***Pygocentrus nattereri* Kner, 1858**	ZB	Mills and Vevers 1989	FS	Ferreira et al. 2014
***Serrasalmus rhombeus* (Linnaeus, 1766)**	PV	Planquette et al. 1996	FS	Planquette et al. 1996
***Serrasalmus spilopleura* Kner, 1858**	PV	Alves and Filho 1996	FS	Agostinho and Júlio 200)
***Schizodon fasciatus* Spix & Agassiz, 1829**	HV	Planquette et al. 1996	FS	Planquette et al. 1996
***Leporinus friderici* (Bloch, 1794)**	ZP	Boujard et al. 1997	FS	Cordiviola de Yuan and Pignalberi de Hassan 1985 Cordiviola de Yuan and

				Pignalberi de Hassan 1985
***Steindachnerina elegans* (Steindachner, 1875)**	DV	Ribeiro et al. 2007	FS	Ribeiro et al. 2007
***Astyanax bimaculatus* (Linnaeus, 1758)**	ZB	Alves and Filho 1996	FS	Kenny 1995
***Hemigrammus marginatus* Ellis, 1911**	OV	Barreto et al. 2018	FS	Barreto et al. 2018
***Hypostomus plecostomus* (Linnaeus, 1758)**	HV	Alves and Filho 1996	FS	Oliveira and Isaac 2013
***Loricaria parnahybae* Steindachner, 1907**	ZB	Alves and Filho 1996	FS	Londoño-Burbano et al. 2020
***Aspistor luniscutis* (Valenciennes, 1840)**	OV	Denadai et al. 2012	MS	Denadai et al. 2012
***Aspistor quadriscutis* (Valenciennes, 1840)**	ZB	Denadai et al. 2012	MS	Denadai et al. 2012
***Bagre bagre* (Linnaeus, 1766)**	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Bagre marinus* (Mitchill, 1815)**	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Cathorops agassizii* (Eigenmann & Eigenmann, 1888)**	ZB	Passarone et al. 2019	ES	Passarone et al. 2019
***Cathorops spixii* (Agassiz, 1829)**	ZB	Passarone et al. 2019	ES	Passarone et al. 2019
***Genidens genidens* (Cuvier, 1829)**	PV	Passos et al. 2013	MM	Passos et al. 2013
***Notarius grandicassis* (Valenciennes, 1840)**	ZP	Mendes 1999	ES	Cervigón, 1992
***Sciades couma* (Valenciennes, 1840)**	ZP	le Bail et al. 2000	ES	Reis-Filho et al. 2010
***Sciades herzbergii* (Bloch, 1794)**	ZB	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Sciades parkeri* (Traill, 1832)**	PV	Mendes 1999	ES	Leopold 2004
***Sciades proops* (Valenciennes, 1840)**	ZB	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Aspredo aspredo* (Linnaeus, 1758)**	OV	Herbert 2015	FS	Froese and Pauly 2018
***Aspredinichthys tibicen* (Valenciennes, 1840)**	-	-	FS	le Bail et al. 2000
***Ageneiosus inermis* (Linnaeus, 1766)**	PV	Boujard et al. 1997	FM	Boujard et al. 1997
***Pseudauchenipterus nodosus* (Bloch, 1794)**	OV	le Bail et al. 2000	FM	Kenny 1995
***Trachelyopterus galeatus* (Linnaeus, 1766)**	ZB	Alves and Filho 1996	-	-
***Pimelodella cristata* (Muller & Troschel, 1849)**	-	-	FS	Mol 1958
***Pimelodella lateristriga* (Lichtenstein, 1823)**	PV	Alves and Filho 1996	-	-

***Brachyplatystoma vaillantii* (Valenciennes, 1840)**	PV	Cuvier and Valenciennes 1840	FS	le Bail et al. 2000
***Pseudoplatystoma fasciatum* (Linnaeus, 1766)**	OV	Burgess 1989	FS	Burgess 1989
***Sorubim lima* (Bloch & Schneider, 1801)**	PV	Goulding 1981	-	-
***Synodus foetens* (Linnaeus, 1766)**	PV	Cruz-Escalona et al. 2005	MS	Vasconcelos Filho and Oliveira 1999
***Synodus poeyi* Jordan, 1887**	-	-	-	-
***Trachinocephalus myops* (Forster, 1801)**	PV	Fischer et al. 1990	MS	Heemstra 1995
***Holocentrus adscensionis* (Osbeck, 1765)**	ZB	Greenfield and Thomerson 1997	MS	Silva Júnior et al. 2015
***Amphichthys cryptocentrus* (Valenciennes, 1837)**	ZB	Collette 2003	ES	Reis-Filho et al. 2010
***Batrachoides surinamensis* (Bloch & Schneider, 1801)**	ZB	Collette 2003	MS	Uyeno et al. 1983
***Thalassophryne nattereri* Steindachner, 1876**	ZB	Collette 2003b	MS	Vasconcelos Filho and Oliveira 1999
***Thalassophryne punctata* Steindachner, 1876**	-	-	-	-
***Phaeoptyx pigmentaria* (Poey, 1860)**	ZP	Greenfield and Johnson 1990	MS	Greenfield & Johnson, 1990
***Dormitator maculatus* (Bloch, 1792)**	PV	Alves and Filho 1996	AM	Elliott et al. 2007
***Eleotris pisonis* (Gmelin, 1789)**	ZB	Alves and Filho 1996	FM	Nordlie 1981
***Erotelis smaragdus* (Valenciennes, 1837)**	-	-	MM	Dawson 1971
***Guavina guavina* (Valenciennes, 1837)**	ZB	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Awaous tajasica* (Lichtenstein, 1822)**	ZB	Miller 2005	AM	Miller 2005
***Bathygobius mystacium* Ginsburg, 1947**	PV	Silva 2018	MS	Tornabene et al. 2010
***Bathygobius soporator* (Valenciennes, 1837)**	ZB	Passos et al. 2013	MM	Passos et al. 2013
***Coryphopterus glaucofraenum* Gill, 1863**	ZB	Smith 1997	MS	Finley and Forrester 2003
***Ctenogobius boleosoma* (Jordan & Gilbert, 1882)**	DV	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Ctenogobius saepepallens* (Gilbert & Randall, 1968)**	ZB	Randall 2004	MS	Baldwin and Smith 2003; Ross and Rhode 2004
***Ctenogobius shufeldti* (Jordan & Eigenmann, 1887)**	OV	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Ctenogobius smaragdus* (Valenciennes, 1837)**	DV	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Ctenogobius stigmaticus* (Poey, 1860)**	DV	Ferreira et al. 2019	ES	Ferreira et al. 2019

***Evorthodus lyricus* (Girard, 1858)**	DV	Ferreira et al. 2019	MS	Vasconcelos Filho and Oliveira 1999
***Gobioides broussonnetii* Lacepède, 1800**	DV	da Silva and Fabré et al. 2019	ES	Passos et al. 2013
***Gobionellus oceanicus* (Pallas, 1770)**	DV	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Gobionellus stomatus* Starks, 1913**	DV	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Microdesmus bahianus* Dawson, 1973**	-	-	MS	Castro 2005
***Microdesmus longipinnis* (Weymouth, 1910)**	-	-	ES	Harrison et al. 2003
***Microgobius meeki* Evermann & Marsh, 1899**	ZB	Ferreira et al. 2019	MS	Ferreira et al. 2019
***Abudefduf saxatilis* (Linnaeus, 1758)**	OP	Emery 1978	MS	Emery 1978
***Stegastes fuscus* (Cuvier, 1830)**	OV	Paiva et al. 2009	MS	Cervigón 1993
***Stegastes variabilis* (Castelnau, 1855)**	ZB	Cervigón 1993	MS	Cervigón 1993
***Opistognathus cuvierii* Valenciennes, 1836**	ZP	Reis-Filho 2011	MS	Haimovici and Klippel 1999
***Mugil brevirostris* (Ribeiro, 1915)**	-	-	MM	Barletta and Dantas 2016
***Mugil curema* Valenciennes, 1836**	DV	Elliott et al. 2007	MM	Ferreira et al. 2019
***Mugil curvidens* Valenciennes, 1836**	DV	da Silva and Fabré et al. 2019	ES	Passos et al.2013
***Mugil incilis* Hancock, 1830**	DV	Favero et al. 2019	ES	Passos et al. 2013
***Mugil liza* Valenciennes, 1836**	DV	da Silva and Fabré et al. 2019	CA	Passos et al. 2013
***Mugil rubrioculus* Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007**	DV	da Silva and Fabré et al. 2019	MM	da Silva and Fabré et al. 2019
***Cichla ocellaris* Bloch & Schneider, 1801**	PV	Alves and Filho 1996	FS	Keith et al. 2000
***Oreochromis niloticus* (Linnaeus, 1758)**	ZB	Alves and Filho 1996	FS	de Moor and Bruton 1988
***Dactyloscopus crossotus* Starks, 1913**	ZB	Guedes et al. 2015	MS	Paiva et al. 2009
***Scartella cristata* (Linnaeus, 1758)**	HV	Randall 1996	MM	Cervigón 1994
***Labrisomus nuchipinnis* (Quoy & Gaimard, 1824)**	ZB	Randall 1996	MS	Cervigón 1994
***Atherinella brasiliensis* (Quoy & Gaimard, 1825)**	OV	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Atherinella cf. blackburni* (Schultz, 1949)**	PV	Favero et al. 2019	MM	Favero et al. 2019
***Odontesthes bonariensis* (Valenciennes, 1835)**	ZP	Piedras and Pouey 2005	FM	Nakamura et al. 1986
***Cheilopogon melanurus* (Valenciennes, 1847)**	PV/ZP	Rahaman 2015	MS	Rahaman 2015
***Hirundichthys affinis* (Gunther, 1866)**	PV	Oxenford 2007	MS	Cervigón et al. 1992
***Hemiramphus balao* Lesueur, 1821**	HV	Alves and Filho 1996	MS	Collette 1999

***Hemiramphus brasiliensis* (Linnaeus, 1758)**	PV	Passos et al. 2013	MM	Passos et al. 2013
***Hyporhamphus roberti roberti* (Valenciennes, 1847)**	-	-	MS	Passos et al. 2013
***Hyporhamphus unifasciatus* (Ranzani, 1841)**	OV	Passos et al. 2013	MM	Ferreira et al. 2019
***Ablennes hians* (Valenciennes, 1846)**	PV	Collette 1995	MS	Sasekumar et al. 1992
***Strongylura marina* (Walbaum, 1792)**	PV	Passos et al. 2013	MM	Passos et al. 2013
***Strongylura timucu* (Walbaum, 1792)**	PV	Passos et al. 2013	MM	Passos et al. 2013
***Tylosurus acus acus* (Lacepède, 1803)**	PV	Contente et al. 2009	MS	Ferreira et al. 2019
***Tylosurus crocodilus crocodilus* (Péron & Lesueur, 1821)**	PV	Alves and Filho 1996	MM	Favero et al. 2019
***Poecilia vivipara* Bloch & Schneider, 1801**	PV	Paiva et al.,2009	ES	Keith et al. 2000
***Rachycentron canadum* (Linnaeus, 1766)**	PV	Collette 1999a	MS	Collette 1999
***Echeneis naucrates* Linnaeus, 1758**	DV	Williams Jr et al., 2003	MS	Vasconcelos Filho and Oliveira 1999
***Phtheirichthys lineatus* (Menzies, 1791)**	OP	Heemstra 1995	MS	Heemstra 1995
***Remora remora* (Linnaeus, 1758)**	PV	Alves and Filho 1996	MS	Cressey and Lachner 1970
***Carangoides bartholomaei* (Cuvier, 1833)**	PV	Paiva et al. 2008	MS	Santos 2012
***Caranx crysos* (Mitchill, 1815)**	PV	Sley et al. 2009	MS	Ferreira 2018
***Caranx hippos* (Linnaeus, 1766)**	PV	Temóteo et al. 2015	MS	Vasconcelos Filho and Oliveira 1999
***Caranx latus* Agassiz, 1831**	ZB	Passos et al. 2013	MS	Vasconcelos Filho and Oliveira 1999
***Chloroscombrus chrysurus* (Linnaeus, 1766)**	OP	Passos et al. 2013	MS	Vasconcelos Filho and Oliveira 1999
***Hemicaranx amblyrhynchus* (Cuvier, 1833)**	ZB	Cerqueira 2018	MM	Menezes and Figueiredo 1980
***Oligoplites palometa* (Cuvier, 1832)**	PV	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Oligoplites saliens* (Bloch, 1793)**	PV	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Oligoplites saurus* (Bloch & Schneider, 1801)**	PV	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Selene brownii* (Curvier, 1816)**	ZB	Bomfim 2014	MS	Ferreira et al. 2019
***Selene setapinnis* (Mitchill, 1815)**	PV	Menezes and Figueiredo 1980	MS	Passos et al. 2013
***Selene vomer* (Linnaeus, 1758)**	ZB	Passos et al. 2013	MM	Passos et al. 2013

***Trachinotus carolinus* (Linnaeus, 1766)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Trachinotus cayennensis* Cuvier, 1832**	ZB	Castro et al. 2019	MM	Cervigón 1993
***Trachinotus falcatus* (Linnaeus, 1758)**	ZB	Passos et al. 2013	MS	Vasconcelos Filho and Oliveira 1999
***Trachinotus goodei* Jordan & Evermann, 1896**	ZB	Ferreira et al. 2019	MS	Ferreira et al. 2019
***Sphyraena barracuda* (Edwards, 1771)**	PV	Ferreira et al. 2019	MM	Osório et al. 2011
***Sphyraena guachancho* Cuvier, 1829**	PV	Lopes et al. 2012	MS	Ferreira 2018
***Citharichthys arenaceus* Evermann & Marsh, 1900**	ZB	Passos et al. 2013	MS	da Silva and Fabré et al. 2019
***Citharichthys cornutus* (Günther, 1880)**	-	-	-	-
***Citharichthys macrops* Dresel, 1885**	ZB	Passos et al.,2013	MS	Passos et al, 2013
***Citharichthys spilopterus* Günther, 1862**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Etropus crossotus* Jordan & Gilbert, 1882**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Etropus longimanus* Norman, 1933**	ZB	Figueiredo and Menezes 2000	MS	Saad and Fagundes Netto 1992; Derisio et al. 2012
***Paralichthys brasiliensis* (Ranzani, 1842)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Paralichthys orbignyanus* (Valenciennes, 1839)**	ZB	Prisco et al. 2001	MM	Prisco et al. 2001
***Paralichthys tropicus* Ginsburg, 1933**	ZB	Rosas et al. 1999	MM	Reis-Filho et al. 201
***Syacium micrurum* Ranzani, 1842**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Syacium papillosum* (Linnaeus, 1758)**	ZB	Ferreira et al. 2019	MS	Ferreira et al. 2019
***Bothus lunatus* (Linnaeus, 1758)**	ZB	Robins and Ray 1986	MS	Robins and Ray 1986
***Bothus ocellatus* (Agassiz, 1831)**	ZB	Ferreira et al., 201	MM	Ferreira et al. 2019
***Bothus robinsi* Topp & Hoff, 1972**	ZB	Figueiredo and Menezes 2000	MS	Mendonça and Araújo 2002; Marancik et al. 2005
***Achirus achirus* (Linnaeus, 1758)**	ZB	Carpenter 2003	ES	Carpenter 2003
***Achirus declivis* Chabanaud, 1940**	ZB	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Achirus lineatus* (Linnaeus, 1758)**	ZB	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Achirus mucuri* Ramos, Ramos & Lopes, 2009**	-	-	-	-
***Trinectes microphthalmus* (Chabanaud, 1928)**	OV	Favero 201)	MM	Reis-Filho et al. 2010

***Trinectes paulistanus* (Miranda Ribeiro, 1915)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Symphurus diomedeanus* (Goode & Bean, 1885)**	ZB	Carpenter 2003	MS	Reis-Filho et al. 2010
***Symphurus plagusia* (Bloch & Schneider, 1801)**	PV	Paiva et al. 2009	MM	Reis-Filho et al. 2010
***Symphurus tessellatus* (Quoy & Gaimard, 1824)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Bryx dunckeri* (Metzelaar, 1919)**	PV	Favero et al. 2019	MM	Favero et al. 2019
***Cosmocampus elucens* (Poey, 1868)**	ZB	Fritzsche 1990	MS	Passos et al, 2013
***Hippocampus erectus* Perry, 1810**	ZB	Vieira and Musick 1993	MS	Vasconcelos Filho and Oliveira 1999
***Hippocampus reidi* Ginsburg, 1933**	ZP	Felício et al. 2006	MM	Osório et al. 2011
***Microphis brachyurus lineatus* (Kaup, 1856)**	ZP	Frias-Torres 2004	ES	Frias-Torres 2004
***Microphis brachyurus brachyurus* (Bleeker, 1854)**	ZP	Dawson 1985	AN	Gilmore and Hastings 1983
***Fistularia petimba* Lacepède, 1803**	PV	Paiva et al. 2009	ES	Passos et al. 2013
***Fistularia tabacaria* Linnaeus, 1758**	ZP	Passos et al. 2013	MM	Passos et al. 2013
***Syngnathus pelagicus* Linnaeus, 1758**	ZP	Passos et al, 2013	MS	Passos et al. 2013
***Dactylopterus volitans* (Linnaeus, 1758)**	PV	Paiva et al. 2009	MS	Passos et al. 2013
***Trichiurus lepturus* Linnaeus, 1758**	PV	Vasconcelos Filho et al. 2010	MS	Vasconcelos Filho and Oliveira 1999
***Euthynnus alletteratus* (Rafinesque, 1810)**	PV	Collette and Nauen 1983	MS	Collette and Nauen 1983
***Scomberomorus brasiliensis* Collette, Russo & Zavala-Camin, 1978**	PV	Helfman et al. 2009	MS	Vasconcelos Filho and Oliveira 1999
***Scomberomorus cavalla* (Cuvier, 1829)**	PV	da Silva and Fabré et al. 2019	MS	da Silva and Fabré et al. 2019
***Scomberomorus maculatus* (Mitchill, 1815)**	PV	Collette and Nauen 1983	MS	Elliott et al. 2007
***Scomberomorus regalis* (Bloch, 1793)**	PV	Helfman et al. 2009	MS	Riede 2004
***Peprilus paru* (Linnaeus, 1758)**	OV	Passos et al. 2013	MS	Passos et al. 2013
***Astroscopus y-graecum* Cuvier, 1829**	PV	Cervigón 1994	MS	Grimes et al. 1982; Peterson et al. 2000; Cézar Felix et al. 2006
***Halichoeres poeyi* (Steindachner, 1867)**	ZB	(Nunes et al. 2013	MS	Carpenter 2003

***Nicholsina usta* (Valenciennes, 1840)**	HV	Carpenter 2003	MS	Carpenter 2003
***Sparisoma amplum* (Ranzani, 1842)**	HV	Ferreira and Gonçalves 2006	MS	Moura et al. 2001
***Sparisoma axillare* (Steindachner, 1878)**	HV	Ferreira and Gonçalves, 2006	MS	Moura et al. 2001
***Sparisoma radians* (Valenciennes, 1840)**	HV	Paiva et al. 2008	MS	Vasconcelos Filho and Oliveira 1999
***Centropomus ensiferus* Poey, 1860**	OV	Favero 2019	MM	da Silva and Fabré et al. 2019
***Centropomus mexicanus* Bocourt, 1868**	PV	Keith et al. 2000	MM	Keith et al. 2000
***Centropomus parallelus* Poey, 1860**	PV	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Centropomus pectinatus* Poey, 1860**	PV	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Centropomus undecimalis* (Bloch, 1792)**	PV	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Diapterus auratus* Ranzani, 1842**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Diapterus rhombeus* (Cuvier, 1829)**	ZP	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Eucinostomus argenteus* Baird & Girard, 1855**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Eucinostomus gula* (Quoy & Gaimard, 1824)**	ZB	Ferreira et al. 2019	MM	Passos et al. 2013
***Eucinostomus havana* (Nichols, 1912)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Eucinostomus melanopterus* (Bleeker, 1863)**	ZB	Ferreira et al. 2019	MM	Passos et al. 2013
***Eugerres brasilianus* (Cuvier, 1830)**	OV	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Gerres cinereus* (Walbaum, 1792)**	ZB	Carpenter 2003	MM	Reis-Filho et al. 2010
***Ulaema lefroyi* (Goode, 1874)**	PV	Paiva et al. 2009	MM	Favero et al. 2019
***Pseudupeneus maculatus* (Bloch, 1793)**	ZB	Soares et al. 2020	MS	Vasconcelos Filho and Oliveira 1999
***Alphestes afer* (Bloch, 1793)**	ZB	Randall 1967	MS	Medeiros et al. 2009; Marques and Ferreira 2011
***Diplectrum radiale* (Quoy & Gaimard, 1824)**	PV	Alves and Filho 1996	MM	Reis-Filho et al. 2010
***Epinephelus adscensionis* (Osbeck, 1765)**	ZB	Medeiros et al. 2010	MS	Pereira 2014
***Epinephelus itajara* (Lichtenstein, 1822)**	PV/OP	Freitas et al. 2015	MS	Paiva et al. 2009
***Epinephelus marginatus* (Lowe, 1834)**	OP	Medeiros et al. 2010	MS	Andrade et al. 2003

***Hyporthodus nigritus* (Holbrook, 1855)**	ZB	Passos et al. 2013	MS	Damasceno et al. 2016
***Mycteroperca bonaci* (Poey, 1860)**	PV	Daros 2014	MS	Daros 2014
***Mycteroperca tigris* (Valenciennes, 1833)**	PV	Carpenter 2003	MS	Carpenter 2003
***Mycteroperca venenosa* (Linnaeus, 1758)**	PV	Carpenter 2003	MS	Carpenter 2003
***Rypticus randalli* Courtenay, 1967**	PV	Medeiros et al. 2017	MS	Nakayama et al. 2020
***Rypticus saponaceus* (Bloch & Schneider, 1801)**	ZB	Dantas et al. 2012	MS	Vasconcelos Filho and Oliveira 1999
***Serranus flaviventris* (Cuvier, 1829)**	OP	Maia-Nogueira et al. 2008	MS	Lieske and Myers 1994
***Serranus phoebe* Poey, 1851**	ZB	Robins and Starck 1961	MS	Cervigón et al. 1992
***Pomacanthus arcuatus* (Linnaeus, 1758)**	ZB	Allee et al. 2000	MS	Gasparini et al. 2005
***Pomacanthus paru* (Bloch, 1787)**	ZB	Allee et al. 2000	MS	Vasconcelos Filho and Oliveira 1999
***Chaetodon ocellatus* (Bloch, 1787)**	ZB	Ferreira 2018	MS	Ferreira 2018
***Chaetodon striatus* Linnaeus, 1758**	ZP	Liedke et al. 2016	MS	Vasconcelos Filho and Oliveira 1999
***Anisotremus surinamensis* (Bloch, 1791)**	ZB	Robins and Ray 1986	MS	Passos et al. 2013
***Anisotremus virginicus* (Linnaeus, 1758)**	OV	Ferreira et al., 201	MS	Ferreira et al. 2019
***Conodon nobilis* (Linnaeus, 1758)**	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Genyatremus luteus* (Bloch, 1790)**	ZB	Passos et al. 2013	MS	Vasconcelos Filho and Oliveira 1999
***Haemulon aurolineatum* Cuvier, 1830**	ZB	Pereira et al. 2015	MS	Vasconcelos Filho and Oliveira 1999
***Haemulon parra* (Desmarest, 1823)**	ZB	Paiva et al. 2008	MS	Vasconcelos Filho and Oliveira 1999
***Haemulon plumierii* (Lacepède, 1801)**	ZB	Ferreira et al. 2019	MS	Ferreira et al. 2019
***Haemulon squamipinna* Rocha & Rosa, 1999**	ZP	Pereira et al. 2015	MS	Reis-Filho et al. 2010
***Haemulon steindachneri* (Jordan & Gilbert, 1882)**	ZB	Pereira et al. 2015	MM	Passos et al. 2013
***Orthopristis ruber* (Cuvier, 1830)**	ZB	Cervigón 1993	MS	Cervigón 1993
***Pomadasys corvinaeformis* (Steindachner, 1868)**	ZB	Denadai et al. 2013	MM	Passos et al. 2013
***Pomadasys crocro* (Cuvier, 1830)**	ZB	Ferreira et al. 2019	MS	Riede 2004

***Pomadasys ramosus* Poey, 1860**	ZB	Silva 2018	MM	Passos et al. 2013
***Lutjanus alexandrei* Moura & Linderman, 2007**	ZB	Moraes 2012	MS	Fernandes et al. 2012
***Lutjanus analis* (Cuvier, 1828)**	PV	Passos et al.,2013	MM	Passos et al. 2013
***Lutjanus apodus* (Walbaum, 1792)**	ZB	Alves and Filho 1996	MS	Lieske and Myers 1994
***Lutjanus cyanopterus* (Cuvier, 1828)**	ZB	Allen 1985	MS	Bastos et al. 2013
***Lutjanus griseus* (Linnaeus, 1758)**	PV	Paiva et al. 2009	MS	Smith 1997
***Lutjanus jocu* (Bloch & Schneider, 1801)**	ZB	Monteiro et al. 2009	MS	Vasconcelos Filho and Oliveira 1999
***Lutjanus synagris* (Linnaeus, 1758)**	ZB	Ferreira 2018	MS	Vasconcelos Filho and Oliveira 1999
***Ocyurus chrysurus* (Bloch, 1791)**	ZB	Heck and Weinstein 1989	MS	Vasconcelos Filho and Oliveira 1999
***Polydactylus oligodon* (Gunther, 1860)**	ZB	Passos et al. 2013	MS	Passos et al. 2013
Polydactylus virginicus (Linnaeus, 1758)	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Scorpaena isthmensis* Meek & Hilderbrand, 1928**	PV	Paiva et al. 2009	MS	Passos et al. 2013
***Scorpaena plumieri* Bloch, 1789**	PV	Passos et al.,2013	MS	Edwards 1990
***Prionotus punctatus* (Bloch, 1793)**	ZB	Longo et al. 2015	MS	Vasconcelos Filho and Oliveira 1999
***Chaetodipterus faber* (Broussonet, 1782)**	OV	Passarone et al. 2019	MS	Passos et al. 2013
***Bairdiella ronchus* (Cuvier, 1830)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Cynoscion acoupa* (Lacepède, 1801)**	ZB	Passos et al.,2013	MM	da Silva and Fabré et al. 2019
***Cynoscion jamaicensis* (Vaillant & Bocourt, 1833)**	PV	da Silva and Fabré et al. 2019	MS	da Silva and Fabré et al. 2019
***Cynoscion leiarchus* (Cuvier, 1830)**	PV	Alves and Filho 1996	MS	Passos et al. 2013
***Cynoscion microlepidotus* (Cuvier, 1830)**	PV	da Silva and Fabré et al. 2019	ES	Passos et al. 2013
***Cynoscion steindachneri* (Jordan, 1889)**	OV	Carpenter 2003	ES	Carpenter 2003
***Cynoscion virescens* (Cuvier, 1830)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Isopisthus parvipinnis* (Cuvier, 1830)**	PV	Passarone et al. 2019	MM	Passarone et al. 2019
***Larimus breviceps* Cuvier, 1830**	ZB	Passarone et al. 2019	MM	Passarone et al, 2019

***Macrodon ancylodon* (Bloch & Schneider, 1801)**	PV	Passarone et al. 2019	MM	Passarone et al. 2019
***Menticirrhus americanus* (Linnaeus, 1758)**	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Menticirrhus littoralis* (Holbrook, 1847)**	ZB	Alves and Filho 1996	MM	Passos et al. 2013
***Micropogonias furnieri* (Desmarest, 1823)**	OV	(Lima et al. 2021)	MM	da Silva and Fabré et al. 2019
***Nebris microps* Cuvier, 1830**	ZB	Carpenter 2003	ES	Carpenter 2003
***Odontoscion dentex* (Cuvier, 1830)**	OV	Carpenter 2003	MS	Carpenter 2003
***Ophioscion punctatissimus* Meek & Hildebrand, 1925**	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Paralonchurus brasiliensis* (Steindachner, 1875)**	ZB	Ferreira et al. 2019	MM	Ferreira et al. 2019
***Pareques acuminatus* (Bloch & Schneider, 1801)**	ZB	Froese and Pauly 2017	MM	Chao 1976
***Pogonias cromis* (Linnaeus, 1766)**	ZB	Passos et al. 2013	MS	Passos et al. 2013
***Stellifer brasiliensis* (Schultz, 1945)**	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Stellifer microps* (Steindachner, 1864)**	ZB	Passarone et al. 2019	ES	Passarone et al. 2019
***Stellifer naso* (Jordan, 1889)**	ZB	Silva et al. 2007	ES	Cervigón 1993
***Stellifer rastrifer* (Jordan, 1889)**	ZB	Passarone et al. 2019	MM	Passarone et al. 2019
***Stellifer stellifer* (Bloch, 1790)**	ZB	Passarone et al. 2019	ES	Passarone et al. 2019
***Umbrina coroides* Cuvier, 1830**	ZB	Passos et al. 2013	MS	Passos et al. 2013
***Acanthurus bahianus* Castelnau, 1855**	HV	(Pimentel et al. 2018)	MS	Vasconcelos Filho and Oliveira 1999
***Acanthurus chirurgus* (Bloch, 1787)**	HV	Longo et al. 2015	MS	Vasconcelos Filho and Oliveira 1999
***Acanthurus coeruleus* Bloch & Schneider, 1801**	HV	Ferreira et al. 2019	MS	Ferreira et al. 2019
***Lobotes surinamensis* (Bloch, 1790)**	ZB	Passos et al. 2013	MS	Vasconcelos Filho and Oliveira 1999
***Archosargus probatocephalus* (Walbaum, 1792)**	ZB	Passos et al. 2013	MS	Costa et al. 2007
***Archosargus rhomboidalis* (Linnaeus, 1758)**	ZB	Pauly and Yáñeez-Arancibia 2012	MM	Passos et al. 2013
***Antennarius multiocellatus* (Valenciennes, 1837)**	PV	Randall 1996	ES	Gasparini et al. 2005
***Antennarius striatus* (Shaw, 1794)**	ZB	Nakane et al. 2011	MS	Paiva et al. 2009

***Ogcocephalus vespertilio* (Linnaeus, 1758)**	ZB	Gibran and Castro 1999	MS	Vasconcelos Filho and Oliveira 1999
***Acanthostracion quadricornis* (Linnaeus, 1758)**	OV	Eduardo et al. 2020	MS	Carpenter 2003
***Lactophrys trigonus* (Linnaeus, 1758)**	ZB	Ferreira et al. 2019	MS	Ferreira et al. 2019
***Lactophrys triqueter* (Linnaeus, 1758)**	ZB	Lieske and Myers 1994	MS	Lieske and Myers 1994
***Balistes vetula* Linnaeus, 1758**	ZB	Menezes 1979	MS	Schärer et al. 2010; Rivera Hernándezet al. 2019
***Melichthys niger* (Bloch, 1786)**	OV	Eduardo et al. 2020	MS	Carpenter 2003
***Aluterus heudelotii* Hollard, 1855**	ZP	Eduardo et al. 2020	MS	de Andrade et al. 2015
***Aluterus monoceros* (Linnaeus, 1758)**	OV	Eduardo et al. 2020	MS	de Andrade et al. 2015
***Aluterus schoepfii* (Walbaum, 1792)**	HV	Eduardo et al. 2020	MS	de Andrade et al. 2015
***Cantherhines pullus* (Ranzani, 1842)**	OV	Eduardo et al, 2020	MS	Carpenter 2003
***Monacanthus ciliatus* (Mitchill, 1818)**	ZP	Eduardo et al. 2020	MS	Carpenter 2003
***Stephanolepis hispidus* (Linnaeus, 1766)**	OV	Eduardo et al. 2020	ES	Passos et al. 2013
***Stephanolepis setifer* (Bennett, 1831)**	OV	Eduardo et al. 2020	MS	Carpenter 2003
***Canthigaster figueiredoi* Moura & Castro, 2002**	PV	Eduardo et al. 2020	MS	Carpenter 2003
***Colomesus psittacus* (Bloch & Schneider, 1801)**	ZB	Ferreira et al. 2019	MS	Ferreira et al. 2019
***Lagocephalus laevigatus* (Linnaeus, 1766)**	HV	Passarone et al. 2019	MM	Passarone et al. 2019
***Sphoeroides greeleyi* Gilbert, 1900**	ZB	Ferreira et al. 2019	ES	Ferreira et al. 2019
***Sphoeroides nephelus* (Goode & Bean, 1882)**	PV	Carpenter 2003	MM	Carpenter 2003
***Sphoeroides spengleri* (Bloch, 1785)**	PV/ZB	Eduardo et al. 2020	ES	Favero et al. 2019
***Sphoeroides testudineus* (Linnaeus, 1758)**	ZB	Ferreira et al. 2019	ES	Osório et al. 2011
***Sphoeroides tyleri* Shipp, 1972**	PV	Eduardo et al. 2020	MS	de Andrade et a, 2015
***Chilomycterus antillarum* Jordan & Rutter, 1897**	-	-	MS	Paiva et al. 2009
***Chilomycterus spinosus spinosus* (Linnaeus, 1758)**	ZB	Almeida-Silva et al. 2015	ES	Passos et al. 2013
***Diodon holocanthus* Linnaeus, 1758**	PV	Eduardo et al. 2020	MS	Mundy 2005

***Diodon hystrix* Linnaeus, 1758**	PV	Eduardo et al. 2020	MS	Gasparini and Floeter 2001

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Supplementary Material

Table II: Species and its original name throughout the references.

Species	Original Name
***Ginglymostoma cirratum* (Bonnaterre, 1788)**	*Ginglymostoma cirratum*
***Carcharhinus leucas* (Muller & Henle, 1839)**	
***Carcharhinus limbatus* (Muller & Henle, 1839)**	
***Carcharhinus porosus* (Ranzani, 1839)**	*Carcarhinus porosus*
***Isogomphodon oxyrhynchus* (Muller & Henle, 1839)**	
***Rhizoprionodon lalandii* (Muller & Henle, 1839)**	*Rhizoprionodon lalandei*
***Rhizoprionodon porosus* (Poey, 1861)**	
***Sphyrna lewini* (Griffith & Smith, 1834)**	
***Sphyrna tiburo* (Linnaeus, 1758)**	*Sphyrna tiburo tiburo*
***Sphyrna tudes* (Valenciennes, 1822)**	
***Narcine brasiliensis* (Olfers, 1831)**	
***Pristis pristis* Muller & Henle, 1841**	*Pristis perotteti*
***Pseudobatos percellens* (Walbaum, 1792)**	*Rhinobatos percellens*
***Fontitrygon geijskesi* (Boeseman, 1948)**	*Dasiatis gejskesi*
***Hypanus americanus* (Hildebrand & Schroeder, 1928)**	
***Hypanus guttatus* (Bloch & Schneider, 1801)**	*Dasyatis guttata*
***Hypanus marianae* (Gomes, Rosa & Gadig, 2000)**	*Dasyatis marianae*
***Hypanus say* (Lesueur, 1817)**	*Dasyalis say*
***Gymnura micrura* (Bloch & Scheneider, 1801)**	
***Aetobatus narinari* (Euphrasen, 1790)**	
***Mobula hypostoma* (Bancroft, 1831)**	*Mobula hyppostoma*
***Rhinoptera bonasus* (Mitchill, 1815)**	
***Elops saurus* Linnaeus, 1766**	
***Megalops atlanticus* Valenciennes, 1847**	*Tarpon atlanticus*
***Albula vulpes* (Linnaeus, 1758)**	
***Gymnothorax funebris* Ranzani, 1839**	*Lycodontis funebris*
***Gymnothorax moringa* (Cuvier, 1829)**	
***Gymnothorax ocellatus* Agassiz, 1831**	
***Gymnothorax vicinus* (Castelnau, 1855)**	
***Ahlia egmontis* (Jordan, 1884)**	
***Myrichthys breviceps* (Richardson, 1848)**	
***Myrichthys ocellatus* (Lesueur, 1825)**	
***Myrophis punctatus* Lütken, 1852**	
***Ophichthus cylindroideus* (Ranzani, 1839)**	*Ophichthus parilus*
***Ophichthus ophis* (Linnaeus, 1758)**	
***Cynoponticus savanna* (Bancroft, 1831)**	
***Ariosoma balearicum* (Delaroche, 1809)**	
***Chirocentrodon bleekerianus* (Poey, 1867)**	
***Odontognathus mucronatus* Lacepède, 1800**	

***Pellona flavipinnis* (Valenciennes,1837)**	
***Pellona harroweri* (Fowler, 1917)**	
***Anchoa filifera* (Fowler, 1915)**	
***Anchoa hepsetus* (Linnaeus, 1758)**	
***Anchoa januaria* (Steindachner, 1879)**	
***Anchoa lyolepis* (Evermann & Marsh, 1900)**	
***Anchoa parva* (Meek & Hildebrand, 1923)**	
***Anchoa spinifer* (Valenciennes, 1848)**	
***Anchoa tricolor* (Spix & Agassiz, 1829)**	
***Anchovia clupeoides* (Swainson, 1839)**	*Anchovia nigra*
***Anchoviella lepidentostole* (Fowler, 1911)**	
***Cetengraulis edentulus* (Cuvier, 1829)**	
***Engraulis anchoita* Hubbs & Marini 1935**	
***Lycengraulis batesii* (Gunther, 1868)**	*Lycengraulis barbouri*
***Lycengraulis grossidens* (Spix & Agassiz, 1829)**	
***Pterengraulis atherinoides* (Linnaeus, 1766)**	
***Harengula clupeola* (Cuvier, 1829)**	
***Harengula jaguana* Poey, 1865**	
***Lile piquitinga* (Schreiner & Miranda Ribeiro, 1903)**	
***Opisthonema oglinum* (Lesueur, 1818)**	
***Platanichthys platana* (Regan, 1917)**	
***Rhinosardinia amazonica* (Steindachner, 1879)**	
***Rhinosardinia bahiensis* (Steindachner, 1879)**	
***Hoplias malabaricus* (Bloch, 1794)**	
***Prochilodus argenteus* Spix & Agassiz, 1829**	
***Pygocentrus nattereri* Kner, 1858**	*Serrasalmus nattereri*
***Serrasalmus rhombeus* (Linnaeus, 1766)**	
***Serrasalmus spilopleura* Kner, 1858**	
***Schizodon fasciatus* Spix & Agassiz, 1829**	
***Leporinus friderici* (Bloch, 1794)**	
***Steindachnerina elegans* (Steindachner, 1875)**	
***Astyanax bimaculatus* (Linnaeus, 1758)**	
***Hemigrammus marginatus* Ellis, 1911**	
***Hypostomus plecostomus* (Linnaeus, 1758)**	
***Loricaria parnahybae* Steindachner, 1907**	
***Aspistor luniscutis* (Valenciennes, 1840)**	*Tachysurus luniscutis*
***Aspistor quadriscutis* (Valenciennes, 1840)**	*Arius quadriscutis*
***Bagre bagre* (Linnaeus, 1766)**	
***Bagre marinus* (Mitchill, 1815)**	
***Cathorops agassizii* (Eigenmann & Eigenmann, 1888)**	
***Cathorops spixii* (Agassiz, 1829)**	
***Genidens genidens* (Cuvier, 1829)**	
***Notarius grandicassis* (Valenciennes, 1840)**	*Arius grandicassis*
***Sciades couma* (Valenciennes, 1840)**	

***Sciades herzbergii* (Bloch, 1794)**	*Arius herzbergii*; Hexanematichthys herzbergii; *Tachysurus herzbergii*
***Sciades parkeri* (Traill, 1832)**	*Arius parkeri*
***Sciades proops* (Valenciennes, 1840)**	*Hexanematichthys proops*
***Aspredo aspredo* (Linnaeus, 1758)**	
***Aspredinichthys tibicen* (Valenciennes, 1840)**	
***Ageneiosus inermis* (Linnaeus, 1766)**	*Ageneiosus brevifilis*
***Pseudauchenipterus nodosus* (Bloch, 1794)**	
***Trachelyopterus galeatus* (Linnaeus, 1766)**	
***Pimelodella cristata* (Muller & Troschel, 1849)**	
***Pimelodella lateristriga* (Lichtenstein, 1823)**	
***Brachyplatystoma vaillantii* (Valenciennes, 1840)**	
***Pseudoplatystoma fasciatum* (Linnaeus, 1766)**	
***Sorubim lima* (Bloch & Schneider, 1801)**	
***Synodus foetens* (Linnaeus, 1766)**	
***Synodus poeyi* Jordan, 1887**	
***Trachinocephalus myops* (Forster, 1801)**	
***Holocentrus adscensionis* (Osbeck, 1765)**	*Holocentrus adscensiones*
***Amphichthys cryptocentrus* (Valenciennes, 1837)**	
***Batrachoides surinamensis* (Bloch & Schneider, 1801)**	
***Thalassophryne nattereri* Steindachner, 1876**	
***Thalassophryne punctata* Steindachner, 1876**	
***Phaeoptyx pigmentaria* (Poey, 1860)**	
***Dormitator maculatus* (Bloch, 1792)**	*Domitator maculatus*
***Eleotris pisonis* (Gmelin, 1789)**	
***Erotelis smaragdus* (Valenciennes, 1837)**	
***Guavina guavina* (Valenciennes, 1837)**	
***Awaous tajasica* (Lichtenstein, 1822)**	
***Bathygobius mystacium* Ginsburg, 1947**	
***Bathygobius soporator* (Valenciennes, 1837)**	
***Coryphopterus glaucofraenum* Gill, 1863**	
***Ctenogobius boleosoma* (Jordan & Gilbert, 1882)**	*Gobionellus boleosoma*
***Ctenogobius saepepallens* (Gilbert & Randall, 1968)**	
***Ctenogobius shufeldti* (Jordan & Eigenmann, 1887)**	
***Ctenogobius smaragdus* (Valenciennes, 1837)**	*Gobionellus smaragdus*
***Ctenogobius stigmaticus* (Poey, 1860)**	
***Evorthodus lyricus* (Girard, 1858)**	
***Gobioides broussonnetii* Lacepède, 1800**	*Gobioides broussonetti*
***Gobionellus oceanicus* (Pallas, 1770)**	
***Gobionellus stomatus* Starks, 1913**	
***Microdesmus bahianus* Dawson, 1973**	
***Microdesmus longipinnis* (Weymouth, 1910)**	
***Microgobius meeki* Evermann & Marsh, 1899**	
***Abudefduf saxatilis* (Linnaeus, 1758)**	

***Stegastes fuscus* (Cuvier, 1830)**	
***Stegastes variabilis* (Castelnau, 1855)**	
***Opistognathus cuvierii* Valenciennes, 1836**	*Opistognathus cuvieri*
***Mugil brevirostris* (Ribeiro, 1915)**	
***Mugil curema* Valenciennes, 1836**	
***Mugil curvidens* Valenciennes, 1836**	*Mugil trichodon*
***Mugil incilis* Hancock, 1830**	
***Mugil liza* Valenciennes, 1836**	
***Mugil rubrioculus* Harrison, Nirchio, Oliveira, Ron & Gaviria, 2007**	
***Cichla ocellaris* Bloch & Schneider, 1801**	
***Oreochromis niloticus* (Linnaeus, 1758)**	
***Dactyloscopus crossotus* Starks, 1913**	
***Scartella cristata* (Linnaeus, 1758)**	
***Labrisomus nuchipinnis* (Quoy & Gaimard, 1824)**	
***Atherinella brasiliensis* (Quoy & Gaimard, 1825)**	*Xenomelaniris brasiliensis*
***Atherinella cf. blackburni* (Schultz, 1949)**	
***Odontesthes bonariensis* (Valenciennes, 1835)**	
***Cheilopogon melanurus* (Valenciennes, 1847)**	
***Hirundichthys affinis* (Gunther, 1866)**	
***Hemiramphus balao* Lesueur, 1821**	*Hemirhamphus balao*
***Hemiramphus brasiliensis* (Linnaeus, 1758)**	
***Hyporhamphus roberti roberti* (Valenciennes, 1847)**	
***Hyporhamphus unifasciatus* (Ranzani, 1841)**	
***Ablennes hians* (Valenciennes, 1846)**	
***Strongylura marina* (Walbaum, 1792)**	
***Strongylura timucu* (Walbaum, 1792)**	
***Tylosurus acus acus* (Lacepède, 1803)**	
***Tylosurus crocodilus crocodilus* (Péron & Lesueur, 1821)**	
***Poecilia vivipara* Bloch & Schneider, 1801**	
***Rachycentron canadum* (Linnaeus, 1766)**	*Rachycentron canadus*
***Echeneis naucrates* Linnaeus, 1758**	
***Phtheirichthys lineatus* (Menzies, 1791)**	
***Remora remora* (Linnaeus, 1758)**	
***Carangoides bartholomaei* (Cuvier, 1833)**	
***Caranx crysos* (Mitchill, 1815)**	
***Caranx hippos* (Linnaeus, 1766)**	
***Caranx latus* Agassiz, 1831**	
***Chloroscombrus chrysurus* (Linnaeus, 1766)**	
***Hemicaranx amblyrhynchus* (Cuvier, 1833)**	
***Oligoplites palometa* (Cuvier, 1832)**	
***Oligoplites saliens* (Bloch, 1793)**	
***Oligoplites saurus* (Bloch & Schneider, 1801)**	
***Selene brownii* (Curvier, 1816)**	

***Selene setapinnis* (Mitchill, 1815)**	
***Selene vomer* (Linnaeus, 1758)**	
***Trachinotus carolinus* (Linnaeus, 1766)**	
***Trachinotus cayennensis* Cuvier, 1832**	
***Trachinotus falcatus* (Linnaeus, 1758)**	
***Trachinotus goodei* Jordan & Evermann, 1896**	
***Sphyraena barracuda* (Edwards, 1771)**	
***Sphyraena guachancho* Cuvier, 1829**	
***Citharichthys arenaceus* Evermann & Marsh, 1900**	
***Citharichthys cornutus* (Günther, 1880)**	
***Citharichthys macrops* Dresel, 1885**	
***Citharichthys spilopterus* Günther, 1862**	
***Etropus crossotus* Jordan & Gilbert, 1882**	
***Etropus longimanus* Norman, 1933**	
***Paralichthys brasiliensis* (Ranzani, 1842)**	
***Paralichthys orbignyanus* (Valenciennes, 1839)**	
***Paralichthys tropicus* Ginsburg, 1933**	
***Syacium micrurum* Ranzani, 1842**	
***Syacium papillosum* (Linnaeus, 1758)**	
***Bothus lunatus* (Linnaeus, 1758)**	
***Bothus ocellatus* (Agassiz, 1831)**	
***Bothus robinsi* Topp & Hoff, 1972**	
***Achirus achirus* (Linnaeus, 1758)**	
***Achirus declivis* Chabanaud, 1940**	
***Achirus lineatus* (Linnaeus, 1758)**	
***Achirus mucuri* Ramos, Ramos & Lopes, 2009**	
***Trinectes microphthalmus* (Chabanaud, 1928)**	
***Trinectes paulistanus* (Miranda Ribeiro, 1915)**	
***Symphurus diomedeanus* (Goode & Bean, 1885)**	
***Symphurus plagusia* (Bloch & Schneider, 1801)**	
***Symphurus tessellatus* (Quoy & Gaimard, 1824)**	
***Bryx dunckeri* (Metzelaar, 1919)**	*Sygnathus duncheri*
***Cosmocampus elucens* (Poey, 1868)**	
***Hippocampus erectus* Perry, 1810**	
***Hippocampus reidi* Ginsburg, 1933**	
***Microphis brachyurus lineatus* (Kaup, 1856)**	*Oostethus lineatus*
***Microphis brachyurus brachyurus* (Bleeker, 1854)**	
***Fistularia petimba* Lacepède, 1803**	
***Fistularia tabacaria* Linnaeus, 1758**	
***Syngnathus pelagicus* Linnaeus, 1758**	
***Dactylopterus volitans* (Linnaeus, 1758)**	
***Trichiurus lepturus* Linnaeus, 1758**	
***Euthynnus alletteratus* (Rafinesque, 1810)**	*Euthynnus alleterattus*

***Scomberomorus brasiliensis* Collette, Russo & Zavala-Camin, 1978**	
***Scomberomorus cavalla* (Cuvier, 1829)**	
***Scomberomorus maculatus* (Mitchill, 1815)**	
***Scomberomorus regalis* (Bloch, 1793)**	
***Peprilus paru* (Linnaeus, 1758)**	
***Astroscopus y-graecum* Cuvier, 1829**	
***Halichoeres poeyi* (Steindachner, 1867)**	
***Nicholsina usta* (Valenciennes, 1840)**	
***Sparisoma amplum* (Ranzani, 1842)**	
***Sparisoma axillare* (Steindachner, 1878)**	
***Sparisoma radians* (Valenciennes, 1840)**	
***Centropomus ensiferus* Poey, 1860**	
***Centropomus mexicanus* Bocourt, 1868**	
***Centropomus parallelus* Poey, 1860**	
***Centropomus pectinatus* Poey, 1860**	
***Centropomus undecimalis* (Bloch, 1792)**	
***Diapterus auratus* Ranzani, 1842**	*Diapterus olisthostomus*
***Diapterus rhombeus* (Cuvier, 1829)**	
***Eucinostomus argenteus* Baird & Girard, 1855**	
***Eucinostomus gula* (Quoy & Gaimard, 1824)**	
***Eucinostomus havana* (Nichols, 1912)**	
***Eucinostomus melanopterus* (Bleeker, 1863)**	
***Eugerres brasilianus* (Cuvier, 1830)**	
***Gerres cinereus* (Walbaum, 1792)**	
***Ulaema lefroyi* (Goode, 1874)**	
***Pseudupeneus maculatus* (Bloch, 1793)**	
***Alphestes afer* (Bloch, 1793)**	
***Diplectrum radiale* (Quoy & Gaimard, 1824)**	*Diplectrum radeale*
***Epinephelus adscensionis* (Osbeck, 1765)**	
***Epinephelus itajara* (Lichtenstein, 1822)**	
***Epinephelus marginatus* (Lowe, 1834)**	
***Hyporthodus nigritus* (Holbrook, 1855)**	
***Mycteroperca bonaci* (Poey, 1860)**	*Mycteroperca bonasi*
***Mycteroperca tigris* (Valenciennes, 1833)**	
***Mycteroperca venenosa* (Linnaeus, 1758)**	
***Rypticus randalli* Courtenay, 1967**	
***Rypticus saponaceus* (Bloch & Schneider, 1801)**	
***Serranus flaviventris* (Cuvier, 1829)**	
***Serranus phoebe* Poey, 1851**	
***Pomacanthus arcuatus* (Linnaeus, 1758)**	
***Pomacanthus paru* (Bloch, 1787)**	
***Chaetodon ocellatus* (Bloch, 1787)**	
***Chaetodon striatus* Linnaeus, 1758**	

***Anisotremus surinamensis* (Bloch, 1791)**	
***Anisotremus virginicus* (Linnaeus, 1758)**	
***Conodon nobilis* (Linnaeus, 1758)**	
***Genyatremus luteus* (Bloch, 1790)**	
***Haemulon aurolineatum* Cuvier, 1830**	
***Haemulon parra* (Desmarest, 1823)**	
***Haemulon plumierii* (Lacepède, 1801)**	
***Haemulon squamipinna* Rocha & Rosa, 1999**	
***Haemulon steindachneri* (Jordan & Gilbert, 1882)**	
***Orthopristis ruber* (Cuvier, 1830)**	*Orthopristes ruber*
***Pomadasys corvinaeformis* (Steindachner, 1868)**	*Pomadosys corvinaeformis*
***Pomadasys crocro* (Cuvier, 1830)**	
***Pomadasys ramosus* Poey, 1860**	
***Lutjanus alexandrei* Moura & Linderman, 2007**	
***Lutjanus analis* (Cuvier, 1828)**	
***Lutjanus apodus* (Walbaum, 1792)**	
***Lutjanus cyanopterus* (Cuvier, 1828)**	
***Lutjanus griseus* (Linnaeus, 1758)**	
***Lutjanus jocu* (Bloch & Schneider, 1801)**	
***Lutjanus synagris* (Linnaeus, 1758)**	
***Ocyurus chrysurus* (Bloch, 1791)**	
***Polydactylus oligodon* (Gunther, 1860)**	
Polydactylus virginicus (Linnaeus, 1758)	
***Scorpaena isthmensis* Meek & Hilderbrand, 1928**	
***Scorpaena plumieri* Bloch, 1789**	
***Prionotus punctatus* (Bloch, 1793)**	
***Chaetodipterus faber* (Broussonet, 1782)**	
***Bairdiella ronchus* (Cuvier, 1830)**	
***Cynoscion acoupa* (Lacepède, 1801)**	
***Cynoscion jamaicensis* (Vaillant & Bocourt, 1833)**	
***Cynoscion leiarchus* (Cuvier, 1830)**	
***Cynoscion microlepidotus* (Cuvier, 1830)**	
***Cynoscion steindachneri* (Jordan, 1889)**	
***Cynoscion virescens* (Cuvier, 1830)**	
***Isopisthus parvipinnis* (Cuvier, 1830)**	
***Larimus breviceps* Cuvier, 1830**	
***Macrodon ancylodon* (Bloch & Schneider, 1801)**	
***Menticirrhus americanus* (Linnaeus, 1758)**	*Menticirrhus martinicensis*
***Menticirrhus littoralis* (Holbrook, 1847)**	
***Micropogonias furnieri* (Desmarest, 1823)**	*Micropogon furnieri*
***Nebris microps* Cuvier, 1830**	
***Odontoscion dentex* (Cuvier, 1830)**	
***Ophioscion punctatissimus* Meek & Hildebrand, 1925**	
***Paralonchurus brasiliensis* (Steindachner, 1875)**	

***Pareques acuminatus* (Bloch & Schneider, 1801)**	
***Pogonias cromis* (Linnaeus, 1766)**	
***Stellifer brasiliensis* (Schultz, 1945)**	
***Stellifer microps* (Steindachner, 1864)**	
***Stellifer naso* (Jordan, 1889)**	
***Stellifer rastrifer* (Jordan, 1889)**	
***Stellifer stellifer* (Bloch, 1790)**	
***Umbrina coroides* Cuvier, 1830**	
***Acanthurus bahianus* Castelnau, 1855**	
***Acanthurus chirurgus* (Bloch, 1787)**	
***Acanthurus coeruleus* Bloch & Schneider, 1801**	
***Lobotes surinamensis* (Bloch, 1790)**	
***Archosargus probatocephalus* (Walbaum, 1792)**	
***Archosargus rhomboidalis* (Linnaeus, 1758)**	
***Antennarius multiocellatus* (Valenciennes, 1837)**	
***Antennarius striatus* (Shaw, 1794)**	
***Ogcocephalus vespertilio* (Linnaeus, 1758)**	
***Acanthostracion quadricornis* (Linnaeus, 1758)**	*Achantostracium quadricornis*
***Lactophrys trigonus* (Linnaeus, 1758)**	
***Lactophrys triqueter* (Linnaeus, 1758)**	*Rhonesomus triquerte*
***Balistes vetula* Linnaeus, 1758**	
***Melichthys niger* (Bloch, 1786)**	*Melichthys piceus*
***Aluterus heudelotii* Hollard, 1855**	
***Aluterus monoceros* (Linnaeus, 1758)**	
***Aluterus schoepfii* (Walbaum, 1792)**	
***Cantherhines pullus* (Ranzani, 1842)**	
***Monacanthus ciliatus* (Mitchill, 1818)**	
***Stephanolepis hispidus* (Linnaeus, 1766)**	
***Stephanolepis setifer* (Bennett, 1831)**	
***Canthigaster figueiredoi* Moura & Castro, 2002**	
***Colomesus psittacus* (Bloch & Schneider, 1801)**	
***Lagocephalus laevigatus* (Linnaeus, 1766)**	
***Sphoeroides greeleyi* Gilbert, 1900**	
***Sphoeroides nephelus* (Goode & Bean, 1882)**	
***Sphoeroides spengleri* (Bloch, 1785)**	
***Sphoeroides testudineus* (Linnaeus, 1758)**	
***Sphoeroides tyleri* Shipp, 1972**	
***Chilomycterus antillarum* Jordan & Rutter, 1897**	*Cyclichthys antillarum*
***Chilomycterus spinosus spinosus* (Linnaeus, 1758)**	*Chilomycterus spinosus* / *Ciclichthys spinosus spinosus*
***Diodon holocanthus* Linnaeus, 1758**	
***Diodon hystrix* Linnaeus, 1758**	