Tropical Diversity (2025) 5 (1/2): 1-5.
ISSN: 2596-2388
DOI: 10.5281/zenodo.17195488

RESEARCH ARTICLE

Brazilian Reef Fish Database

Mauro J. Cavalcanti[1*] https://orcid.org/0000-0003-2389-1902, Paulo Roberto Duarte Lopes[2] https://orcid.org/0000-0001-5781-5284

[1*]Ecoinformatics Studio, Caixa Postal 18123, CEP 20720-970 Rio de Janeiro, RJ, Brazil, E-mail: maurobio@gmail.com

[2]Departamento de Ciências Biológicas (Museu de Zoologia – Divisão de Peixes), Universidade Estadual de Avenida Transnordestina, s/no (km 03 – BR-116), CEP 44036-900, Feira de Santana, BA, Brazil.

[*]E-mail: maurobio@gmail.com

Received: May 30, 2025 / Accepted: September 24, 2025/ Published: September 26, 2025

Resumo O objetivo deste trabalho é catalogar e documentar a diversidade biológica das espécies de peixes recifais do litoral e das ilhas oceânicas e costeiras do Brasil, mediante a construção de um banco de dados integrado com informações sobre taxonomia, distribuição geográfica, hábitats, situação de conservação, sequências genômicas e bibliografia relevante para cada espécie. Os dados foram obtidos de várias fontes disponíveis na Internet: Catalogue of Life, Genbank/NCBI, Global Biodiversity Information Facility (GBIF), IUCN Red List e Wikipedia. Foram catalogadas 308 espécies válidas de peixes recifais, incluídas em 12 ordens, 56 famílias e 165 gêneros. O banco de dados completo está disponível em: http://coralfish.scienceontheweb.net.

Palavras-Chave: peixes recifais, bancos de dados de biodiversidade, biogeografia marinha, Oceano Atlântico Ocidental.

Abstract The objective of this work is to catalog and document the biological diversity of reef fish species from the Brazilian coastline and associated oceanic and coastal islands. This was achieved through the development of an integrated database with information on taxonomy, geographic distribution, habitats, conservation status, genome sequences and relevant bibliography for each species. Data were compiled from various online sources, including the Catalogue of Life, Genbank/NCBI, Global Biodiversity Information Facility (GBIF), IUCN Red List and Wikipedia. The final dataset comprises 308 valid reef fish species, included in 12 orders, 56 families and 165 genera. The complete database is publicly available at http://coralfish.scienceontheweb.net.

Keywords: coral reef fishes, biodiversity databases, marine biogeography, Western Atlantic Ocean.

Introduction

In contrast to the better-documented ichthyofaunas of the Caribbean and Indo-Pacific, relatively little is known about the taxonomy, ecology and geographic distribution of fishes associated with reef formations in the western South Atlantic. The Brazilian marine ichthyofauna isolated from the Caribbean Sea by the freshwater and sediment outflows of the Amazon and Orinoco rivers – which reduce salinity and increase turbidity of the water, (Ekman, 1953; Briggs, 1974; Palacio, 1982; Rocha, 2003) displays a relatively high degree of species-level endemism (Gilbert, 1973; Moura *et al*., 1999; Floeter & Gasparini, 2000; Joyeux *et al*., 2001; Floeter *et al*., 2008).

Properly integrated and analyzed using data mining techniques and statistical methods that make it possible to detect patterns and identify factors and trends, the large volume of information currently available in large biodiversity databases on the Internet (Bisby, 2000) can provide valuable support for the conservation and sustainable use of biological resources represented by this ichthyofauna.

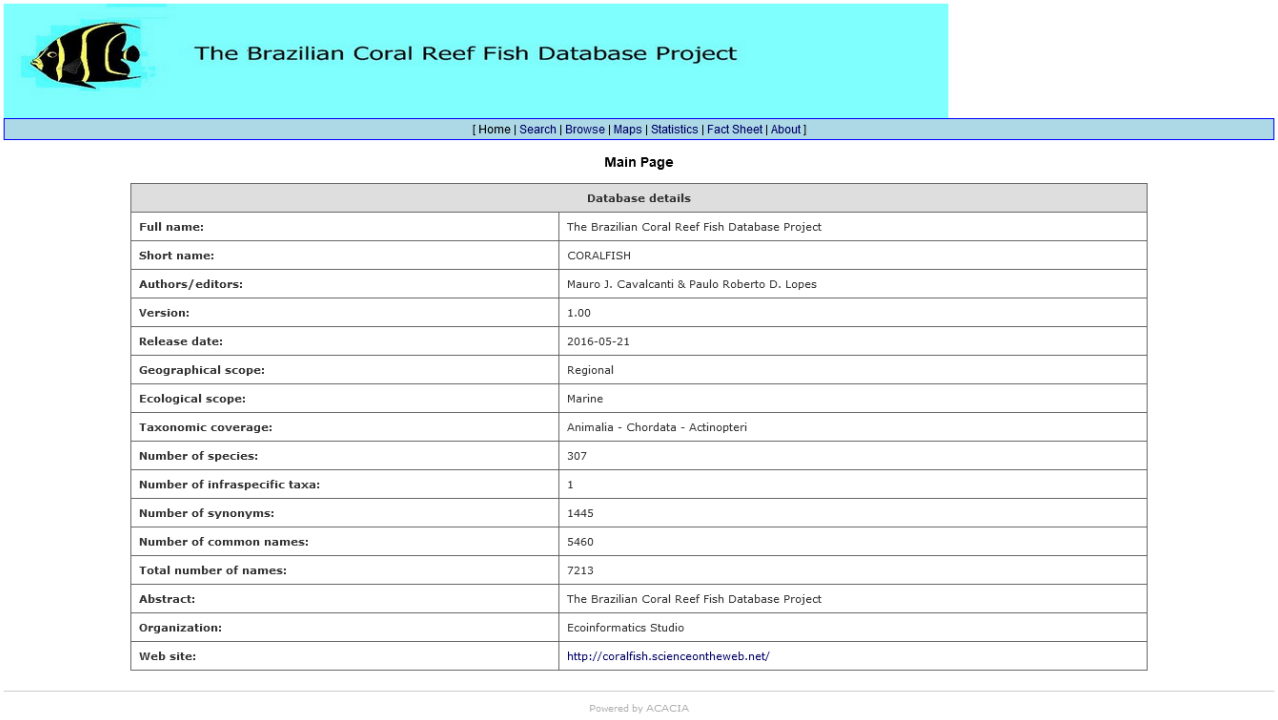
The objective of this project is to catalog and document the biological diversity of reef fish species from the coast and oceanic and coastal islands of Brazil, through the construction of an integrated database with information on taxonomy, geographic distribution, habitats, conservation status, genome sequences and relevant bibliography for each species.

Materials and Methods

The list of reef fish species compiled by Floeter *et al.* (2003) was used to construct the database. These species occur along the coasts of Northeast and Southeast Brazil (Paraíba, Pernambuco, Bahia, Espírito Santo, Rio de Janeiro and São Paulo) and oceanic islands (Rocas Atoll, Fernando de Noronha Archipelago, Penedos de São Pedro and São Paulo, and Trindade Island). This list was previously checked against the Catalogue of Life database (www.catalogueoflife.org) to identify and correct any synonyms and other nomenclatural problems.

The database was implemented using the MySQL database management system (www.mysql.com), based on the generic schema for biodiversity databases ACACIA (Cavalcanti, 2023). A tool developed in the Python language (www.python.org) was used to populate the database tables from several sources available on the Internet that offer interfaces for application programs: FishBase (via Catalogue of Life, www.catalogueoflife.org): nomenclature and literature data, Genbank/NCBI (www.ncbi.nlm.nih.gov/genbank): genome sequence data, Global Biodiversity Information Facility (www.gbif.org): geographic distribution data, IUCN Red List (www.iucnredlist.org): conservation status and habitat data, and Wikipedia (en.wikipedia.org): textual notes. Subsequent data entry, editing and analysis were performed using a web interface written in PHP (www.php.net), with routines developed for generating statistical reports (Fig. 1). Distribution maps were automatically generated by the integrated tool OpenLayers (www.openlayers.org), based on georeferenced occurrence records available in the database (Fig. 2). Results of all database queries can be exported

to files in Excel, CSV or KML standard formats for use with other software as GIS and statistical packages, for more elaborate display and further analysis. The complete database of Brazilian reef fishes is available for consultation at http://coralfish.scienceontheweb.net.


The Brazilian Coral Reef Fish Database Project

[Home | Search | Browse | Maps | Statistics | Fact Sheet | About]

Main Page

Database details	
Full name:	The Brazilian Coral Reef Fish Database Project
Short name:	CORALFISH
Authors/editors:	Mauro J. Cavalcanti & Paulo Roberto D. Lopes
Version:	1.00
Release date:	2016-05-21
Geographical scope:	Regional
Ecological scope:	Marine
Taxonomic coverage:	Animalia - Chordata - Actinopteri
Number of species:	307
Number of infraspecific taxa:	1
Number of synonyms:	1445
Number of common names:	5460
Total number of names:	7213
Abstract:	The Brazilian Coral Reef Fish Database Project
Organization:	Ecoinformatics Studio
Web site:	http://coralfish.scienceontheweb.net/

Powered by ACACIA

Figure 1 – Database browser, displaying the results of a simple query.

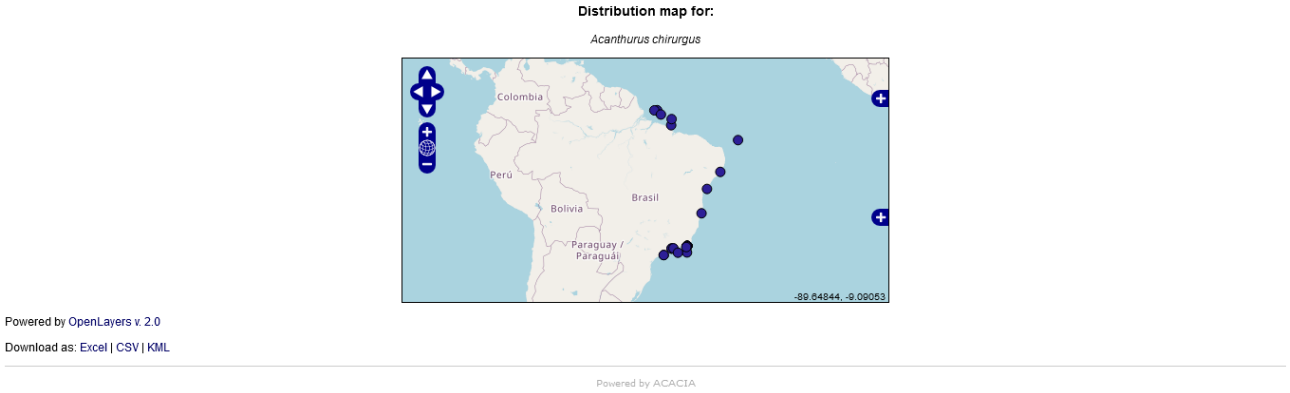


Figure 2 – Distribution map for a selected species.

Results and Discussion

Data were obtained for 308 valid reef fish species, included in 12 orders, 56 families and 165 genera. These species have 1,271 synonyms and 1,111 common names in Brazilian Portuguese. Perciformes (72.7%), Tetraodontiformes (6.82%) and Anguilliformes (5.84%) are the orders with the highest frequency of species, while Serranidae (10%), Carangidae (8%) and Gobiidae (5%) are the most frequent families.

Regarding their ecological distribution, the species occur in 29 habitats, with 124 species (40.3%) associated with rocky bottoms and 53

(17.2%) with sandy bottoms, with only 14 (4.5%) restricted to coral formations themselves; however, even these species are not exclusive to reef environments, also occurring in other habitats.

Regarding the geographic distribution on the Brazilian coast (including continental and oceanic islands), there are 2,981 records of occurrence in 700 locations, with *Trachurus lathami* (83), *Diplectrum radiale* (73) and *Ogcocephalus vespertilio* (69) being the species with the highest number of records.

There are 3,134 nucleotide sequences and 2,748 protein sequences in the database for 211 species (60.5% of the total), of which 89 have more than 40 sequences and the others between 2 and 39 sequences.

Regarding the conservation status, 1 species (*Epinephelus itajara*) is in the Critically Endangered (CR) category, 2 species (*Epinephelus marginatus* and *Scarus trispinosus*) are in the Endangered (EN) category, 8 species (*Hippocampus erectus*, *Hyporthodus niveatus*, *Mycteroperca interstitialis*, *Lutjanus analis*, *L. cyanopterus*, *Enneanectes smithi*, *Coryphopterus thrix* and *Balistes capriscus*) are in the Vulnerable (VU) category, with 243 species in the Least Concern (LC) category, 9 in the Data Deficient (DD) category, and 39 in the Not Evaluated (NE) category, according to the IUCN criteria. No species was listed as Near Threatened (NT), Extinct in the Wild (EW) or Extinct (EX) categories.

Conclusions

The main result of the project was the development and publication of a database on the biodiversity of ichthyofauna associated with reef formations along the Brazilian coast. To our knowledge, this database is, to date, the only initiative of its kind implemented in the world, aiming to consolidate in an integrated database the information available on this ichthyofauna in Brazil. In addition, the modular and open framework used for the implementation of the database can be used in the development of biodiversity databases for other taxonomic groups and geographic regions.

Acknowledgements

We thank Luís Geraldes Primeiro and Valéria Gallo for their review of the manuscript.

References

Bisby, F. A. 2000. The quiet revolution: biodiversity informatics and the internet. Science 289: 2309-2312.

Briggs, J. C. 1974. Marine zoogeography. New York: McGraw-Hill.

Cavalcanti, M. J. 2023. ACACIA: a generic conceptual schema for taxonomic databases. Tropical Diversity 3: 1-6.

Ekman, S. 1953. Zoogeography of the sea. London: Sidgwick & Jackson.

Floeter, S. R. & Gasparini, J. L. 2000. The southwestern Atlantic reef fish fauna: composition and zoogeographic patterns. Journal of Fish Biology 56: 1099-1114.

Floeter, S. R., Gasparini, J. L., Rocha, L. A., Ferreira, C. E. L., Rangel, C. A. & Feitoza, B. M. 2003. Brazilian reef fish fauna: checklist and remarks. Available on the World Wide Web at: Brazilian Reef Fish Project: http://coralfish.scienceontheweb.net/doc/BrazilianChecklist20.pdf.

Floeter, S. R., Rocha, L. A., Robertson, D. R., Joyeux, J. C., Smith-Vaniz, W. F., Wirtz, P., Edwards, A. J., Barreiros, J. P. , Ferreira, C. E. L., Gasparini, J. L., Brito, A., Falcón, J. M., Bowen, B. W. & Bernardi, G. 2008. Atlantic reef fish biogeography and evolution. Journal of Biogeography 35: 22-47.

Gilbert, C. R. 1973. Characteristics of the western Atlantic reef-fish fauna. Quarterly Journal of Florida Academy of Sciences35: 130-144.

Joyeux, J.-C., Floeter, S. R., Ferreira, C. E. L. & Gasparini, J. L. 2001. Biogeography of tropical reef fishes: the South Atlantic puzzle. Journal of Biogeography 28: 831-841.

Moura, R. L., Gasparini, J. L. & Sazima, I. 1999. New records and range extensions of reef fishes in the Western South Atlantic, with notes on reef fish distribution on the Brazilian coast. Brazilian Journal of Zoology16: 513-530.

Palacio, F. J. 1982. Marine zoogeographic review of southern Brazil. Bulletin of the Oceanographic Institute of the University of São Paulo31: 69-92.

Rocha, L. A. 2003. Patterns of distribution and processes of speciation in Brazilian reef fishes. Journal of Biogeography 30: 1161-1171.

