



# Updated checklist of Azores Chondrichthyes (Vertebrata: Gnathostomata)

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## Abstract

### Background

Several lists of marine fish from Azores have been published in the past. Most of those publications are difficult to access on line and several were not published in peer-reviewed journals.

### New information

This checklist updates all the chondrichthyan records for the Azores Exclusive Economic Zone (EEZ), according to the most recent taxonomic classification of cartilaginous fish, as well as providing information on the conservation status for all species. We also present recent literature data on rare species and recent records for Azores. This is the first comprehensive list of cartilaginous fishes from Azores to be published in the GBIF database.

## Keywords

cartilaginous fishes, rays, sharks, species list

## Introduction

Chondrichthyes are commonly known as cartilaginous fishes and includes chimeras, sharks and rays. They can be found from the cold deep-sea to subtropical and tropical waters (Greemberg 2009). Sharks and rays have a great recreational and ecological interest (Vieira et al. 2020); however, many species worldwide are declining due to global overfishing (Worm et al. 2013). The total estimation for risk extinction, according to the IUCN Red List criteria, indicates that a quarter of all shark and ray species are threatened (Dulvy et al. 2014).

The first comprehensive chondrichthyan checklist for Azores was published over 20 years ago by Santos et al. (1997). After that, some updates were made, most of them integrated in marine fish or biodiversity lists (e.g. Porteiro et al. 2010). In the meantime, new publications have emerged regarding new records (e.g. Catarino et al. 2020) or with new information on species already recorded for Azores (e.g. Das and Afonso 2017, Barcelos et al. 2018). The present work gives taxonomic updates and information regarding the conservation status (IUCN) for all chondrichthyan species from the Azores' EEZ (see Suppl. material 1). This is the first complete and updated list of chondrichthyans that can be found in the GBIF online platform (Barcelos et al. 2020).

## General description

**Purpose:** Updating Azorean biota checklists.

## Project description

**Title:** Azores Chondrichthyes updated checklist

**Personnel:** Paulo Borges

**Study area description:** Azores Archipelago

**Funding:** Funding Institutions: Azores PO 2020 - ACORES-01-0145-FEDER-000072; TOTAL BUDGET: €299,901.83 EU Support: €254,916.56. This project was financed by FEDER in 85% and by Azorean Public funds by 15% through the Operational Programme Azores 2020. This work is also funded by FEDER funds through the COMPETE 2020 Programme and National Funds through FCT - Portuguese Foundation for Science and Technology under the Research Infrastructure PORBIOTA - Portuguese E-Infrastructure for Information and Research on Biodiversity, project number POCI-01-0145-FEDER-022127.

## Geographic coverage

**Description:** The Azores EEZ (Exclusive Economic Zone).

**Coordinates:** 34 and 42.976 Latitude; -35.578 and -21 Longitude.

## Taxonomic coverage

**Description:** This dataset covers all the sharks, rays and chimaeras so far known to occur within the Azores' EEZ.

### Taxa included:

Rank	Scientific Name	Common Name
kingdom	Animalia	
phylum	Chordata	
class	Chondrichthyes	
subclass	Holocephali	
subclass	Elasmobranchii	
superorder	Holocephalimorpha	
superorder	Selachimorfa	
superorder	Batoidea	
order	Carcharhiniformes	Ground sharks
order	Chimaeriformes	Chimaeras
order	Hexanchiformes	Frill and cow sharks
order	Lamniformes	Mackerel sharks
order	Myliobatiformes	Stingrays
order	Orectolobiformes	Carpet sharks
order	Rajiformes	Skates and rays
order	Squaliformes	Bramble, sleeper and dogfish sharks
order	Torpediniformes	Electric rays
family	Rhinochimaeridae	
family	Chimaeridae	
family	Sphyrnidae	
family	Carcharhinidae	

family	Triakidae	
family	Pseudotriakidae	
family	Scyliorhinidae	
family	Pentanchidae	
family	Lamnidae	
family	Cetorhinidae	
family	Alopiidae	
family	Odontaspidae	
family	Rhincodontidae	
family	Dalatiidae	
family	Oxynotidae	
family	Somniosidae	
family	Etmopteridae	
family	Centrophoridae	
family	Hexanchidae	
family	Chlamydoselachidae	
family	Mobulidae	
family	Myliobatidae	
family	Dasyatidae	
family	Rajidae	
family	Torpedinidae	
species	<i>Rhinochimaera atlantica</i> Holt & Byrne, 1909	
species	<i>Hydrolagus pallidus</i> Hardy & Stehmann, 1990	
species	<i>Hydrolagus affinis</i> (de Brito Capello, 1868)	
species	<i>Chimaera opalescens</i> Luchetti, Iglésias & Sellos, 2011	
species	<i>Chimaera monstrosa</i> Linnaeus, 1758	
species	<i>Sphyrna zygaena</i> (Linnaeus, 1758)	
species	<i>Prionace glauca</i> (Linnaeus, 1758)	
species	<i>Galeocerdo cuvier</i> (Péron & Lesueur, 1822)	
species	<i>Carcharhinus longimanus</i> (Poey, 1861)	
species	<i>Carcharhinus leucas</i> (Valenciennes, 1839)	

species	<i>Carcharhinus galapagensis</i> (Snodgrass & Heller, 1905)	
species	<i>Galeorhinus galeus</i> (Linnaeus, 1758)	
species	<i>Pseudotriakis microdon</i> de Brito Capello, 1868	
species	<i>Scyliorhinus canicula</i> (Linnaeus, 1758)	
species	<i>Galeus murinus</i> (Collett, 1904)	
species	<i>Apristurus manis</i> (Springer 1979)	
species	<i>Apristurus laurussonii</i> (Saemundsson, 1922)	
species	<i>Lamna nasus</i> (Bonnaterre, 1788)	
species	<i>Isurus paucus</i> Guitart Manday, 1966	
species	<i>Isurus oxyrinchus</i> Rafinesque, 1810	
species	<i>Carcharodon carcharias</i> (Linnaeus, 1758)	
species	<i>Cetorhinus maximus</i> (Gunnerus, 1765)	
species	<i>Alopias vulpinus</i> (Bonnaterre, 1788)	
species	<i>Alopias superciliosus</i> (Lowe, 1841)	
species	<i>Odontaspis ferox</i> (Risso, 1810)	
species	<i>Rhincodon typus</i> Smith, 1828	
species	<i>Squaliolus laticaudus</i> Smith & Radcliffe, 1912	
species	<i>Dalatias licha</i> (Bonnaterre, 1788)	
species	<i>Oxynotus paradoxus</i> Frade, 1929	
species	<i>Zameus squamulosus</i> (Günther, 1877)	
species	<i>Somniosus rostratus</i> (Risso, 1827)	
species	<i>Somniosus microcephalus</i> (Bloch & Schneider, 1801)	
species	<i>Scymnodalatias garricki</i> Kukuev & Konovalenko, 1988	
species	<i>Centroselachus crepidater</i> (Barbosa du Bocage & de Brito Capello, 1864)	
species	<i>Centroscymnus owstonii</i> Garman, 1906	
species	<i>Centroscymnus coelolepis</i> Barbosa du Bocage & de Brito Capello, 1864	
species	<i>Etmopterus spinax</i> (Linnaeus, 1758)	
species	<i>Etmopterus pusillus</i> (Lowe, 1839)	
species	<i>Etmopterus princeps</i> Collett, 1904	
species	<i>Centroscyllium fabricii</i> (Reinhardt, 1825)	

species	<i>Deania profundorum</i> (Smith & Radcliffe, 1912)	
species	<i>Deania calcea</i> (Lowe, 1839)	
species	<i>Centrophorus squamosus</i> (Bonnaterre, 1788)	
species	<i>Centrophorus granulosus</i> (Bloch & Schneider, 1801)	
species	<i>Hexanchus griseus</i> (Bonnaterre, 1788)	
species	<i>Heptranchias perlo</i> (Bonnaterre, 1788)	
species	<i>Chlamydoselachus anguineus</i> Garman, 1884	
species	<i>Mobula tarapacana</i> (Philippi, 1892)	
species	<i>Mobula mobular</i> (Bonnaterre, 1788)	
species	<i>Mobula birostris</i> (Walbaum, 1792)	
species	<i>Myliobatis aquila</i> (Linnaeus, 1758)	
species	<i>Dasyatis pastinaca</i> (Linnaeus, 1758)	
species	<i>Pteroplatytrygon violacea</i> (Bonaparte, 1832)	
species	<i>Taeniurops grabatus</i> (Geoffroy St. Hilaire, 1817)	
species	<i>Dipturus batis</i> (Linnaeus, 1758)	
species	<i>Leucoraja fullonica</i> (Linnaeus, 1758)	
species	<i>Raja brachyura</i> Lafont, 1873	
species	<i>Raja clavata</i> Linnaeus, 1758	
species	<i>Raja maderensis</i> Lowe, 1838	
species	<i>Rajella bigelowi</i> (Stehmann, 1978)	
species	<i>Dipturus oxyrinchus</i> (Linnaeus, 1758)	
species	<i>Bathyraja richardsoni</i> (Garrick, 1961)	
species	<i>Tetronarce nobiliana</i> (Bonaparte, 1835)	

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## Data resources

**Data package title:** Azores chondrichthyes updated checklist

**Resource link:** [http://ipt.gbif.pt/ipt/resource?r=azores\\_chondrichthyes\\_updated\\_checklist\\_vs\\_1&v=1.9](http://ipt.gbif.pt/ipt/resource?r=azores_chondrichthyes_updated_checklist_vs_1&v=1.9)

**Alternative identifiers:** [http://ipt.gbif.pt/ipt/resource?r=azores\\_chondrichthyes\\_updated\\_checklist\\_vs\\_1](http://ipt.gbif.pt/ipt/resource?r=azores_chondrichthyes_updated_checklist_vs_1)

**Number of data sets:** 1

**Data set name:** Azores chondrichthyes updated checklist

**Data format:** Darwin Core

**Description:** This updated checklist of the chondrichthyans already identified within the Azores EEZ follows the last revised version published by Barreiros and Gadig (2011). Two new records have been registered and the taxonomy has been updated. New information regarding the specific occurrence of the rare *Odontaspis ferox* was recently published (see Barcelos et al. 2018). The first comprehensive chondrichthyan checklist was published by Santos et al. (1997) and later updated by Porteiro et al. (2010).

Column label	Column description
id	identification of the record
taxonID	identification of the taxon
acceptedNameUsageID	identification of the usage name
parentNameUsageID	identification of the parent usage name
scientificName	scientific name of the taxon
parentNameUsage	name from which the taxon name originates
kingdom	kingdom
phylum	phylum
class	class
order	order
family	family
genus	genus
specificEpithet	specific epithet
taxonRank	taxon rank
scientificNameAuthorship	scientific name authorship

## Additional information

The following species are referred to the Azores' EEZ by some authors: *Bathytoshia centroura* (Das and Afonso 2017, Santos et al. 2020), *Deania hystricosa* (Compagno

2016), *Dipturus intermedius* (Santos et al. 2020) and *Bathyraja pallida* (Das and Afonso 2017, Santos et al. 2020). However, they were not included in this checklist because those authors, as well as other sources (e.g. IUCN's Red List) report their occurrence as either doubtful or 'need to be confirmed'. As such, this fact does not allow us to have a degree of confidence that these species were actually confirmed to occur within this checklist geographic area.

## Author contributions

LMDB, JMNA and JPB published the updated checklist in GBIF IPT - Portugal and built the framework. LMDB developed this paper and uploaded all the files into the Arphahub platform. All authors read and edited the submitted version and agreed on its present version.

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## Supplementary material

### Suppl. material 1: Species list - taxon remarks and occurrence details

**Authors:** Barcelos LMD, Azevedo JMN, Barreiros JP

**Data type:** taxon remarks, occurrence details, IUCN conservation status

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