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Squatina occulta, Hidden Angelshark

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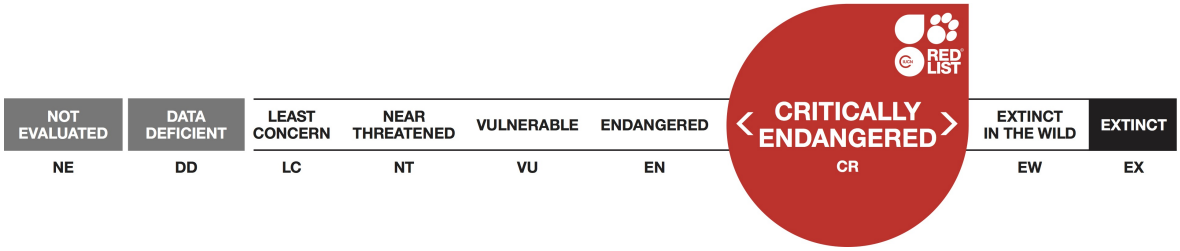

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Chondrichthyes	Squatiniformes	Squatinidae

Taxon Name: *Squatina occulta* Vooren & da Silva, 1991

Common Name(s):

- English: Hidden Angelshark, Smoothback Angel Shark

Taxonomic Source(s):

Fricke, R., Eschmeyer, W.N. and Van der Laan, R. (eds). 2019. Eschmeyer's Catalog of Fishes: genera, species, references. Updated 04 February 2019. Available at: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (Accessed: 04 February 2019).

Taxonomic Notes:

There is some controversy concerning the taxonomy and nomenclature of *Squatina* species of the Southwest Atlantic. *Squatina occulta* described by Vooren and da Silva (1991) has been regarded as being a junior synonym of *S. guggenheim* by Soto (2001) in a species-level checklist of the region. Although evidence was not given to support this statement, Bernardes *et al.* (2005) followed Soto's proposal. However, later studies have re-evaluated the species' validity. The validity of *S. occulta* Vooren and da Silva, 1991 as a distinct species has been confirmed through the study of mitochondrial DNA by Stelbrink *et al.* (2010) and in a comparative study of Southwest Atlantic *Squatina* neurocrania (Carvalho *et al.* 2012). Both studies also recognized *S. argentina*, *S. guggenheim*, and *S. occulta* as the only valid species in the Southwest Atlantic (preceding the description of new species since that time, *S. david* and *S. varii*).

Some confusion exists regarding the publication date of the description of *S. occulta* (Faria *et al.* 2014). Some taxonomic literature sources list 1991 as the publication date while others list 1992. This confusion is probably due to the distribution of pre-prints of the article in 1991 before the full issue of the journal was printed in 1992. According to The International Commission on Zoological Nomenclature, the publication date of the *S. occulta* description is 1991. There has also been discrepancy in referencing the species authority for *S. occulta*, particularly the name of the second author (Faria *et al.* 2014); K.G. da Silva's surname has been spelled 'da Silva', 'Da Silva', and 'Silva'. Faria *et al.* (2014) suggested using the one in the revisions by Vaz and Carvalho (2013) and in online taxonomic databases. Thus, the recommended citation is *S. occulta* Vooren & da Silva, 1991.

Assessment Information

Red List Category & Criteria: Critically Endangered A2bd ver 3.1

Year Published: 2019

Date Assessed: June 7, 2018

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Justification:

The Hidden Angelshark (*Squatina occulta*) is a medium-sized shark (to 160 cm total length) endemic to the Southwest Atlantic inhabiting waters from Rio de Janeiro, Brazil, to Buenos Aires Province, Argentina and likely further south to the northern Patagonia-Argentine region. It is mainly found on the continental shelf at depths of 10-150 m, but has been found at depths to 350 m. The species' low reproductive potential (litter size of 4-10 and a possible three-to-five-year female breeding cycle) together with its susceptibility to capture in both trawl and gillnet gear makes it highly susceptible to population depletion. Angel sharks are heavily fished in southern Brazil and significant reductions have been documented there. In the period from 1988 to 2002, on the continental shelf of southern Brazil, the abundance of *Squatina* species was reduced by approximately 85%, and benthic trawl fishing continued to intensively exploit this population in more recent years. In the same region, scientific fishing cruises conducted between 1986 to 2001 using bottom trawls revealed that the frequency of occurrence and CPUE (in kg/hour and number of individuals/hour) of this species was reduced by 80% confirming trends observed in commercial fisheries. In Argentina, trawl catches of *Squatina* underwent a reduction of 58% in the years 1992-1998, showing a continuing negative trend since then. These are the equivalent of a >99% reduction over three generation lengths (46.5 years), however there may be other areas within its range where fishing intensity is not as high. The catch and trade of this species has been banned in Brazil since 2004, but it is still targeted illegally and caught as bycatch and sold in markets. Given the species' relatively low productivity, the presence of intensive fisheries throughout the species' range, and the level of localized reductions reported, the Hidden Angelshark is inferred to have undergone a population reduction of over 80% over three generation lengths (46.5 years) across its range, and is therefore assessed as Critically Endangered A2bd.

Previously Published Red List Assessments

2007 – Endangered (EN)
http://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T39331A10202712.en

2000 – Endangered (EN)

Geographic Range

Range Description:

The Hidden Angelshark occurs in the Southwest Atlantic from Rio de Janeiro, Brazil (24˚S), through Uruguay to the Puerto Quequén, Buenos Aires Province, Argentina (38˚S) (Estalles *et al.* 2016). Vooren and Klippel (2005) suggested that the species might be present south to 45˚S along the northern Patagonia-Argentine region, however, this requires confirmation.

Country Occurrence:

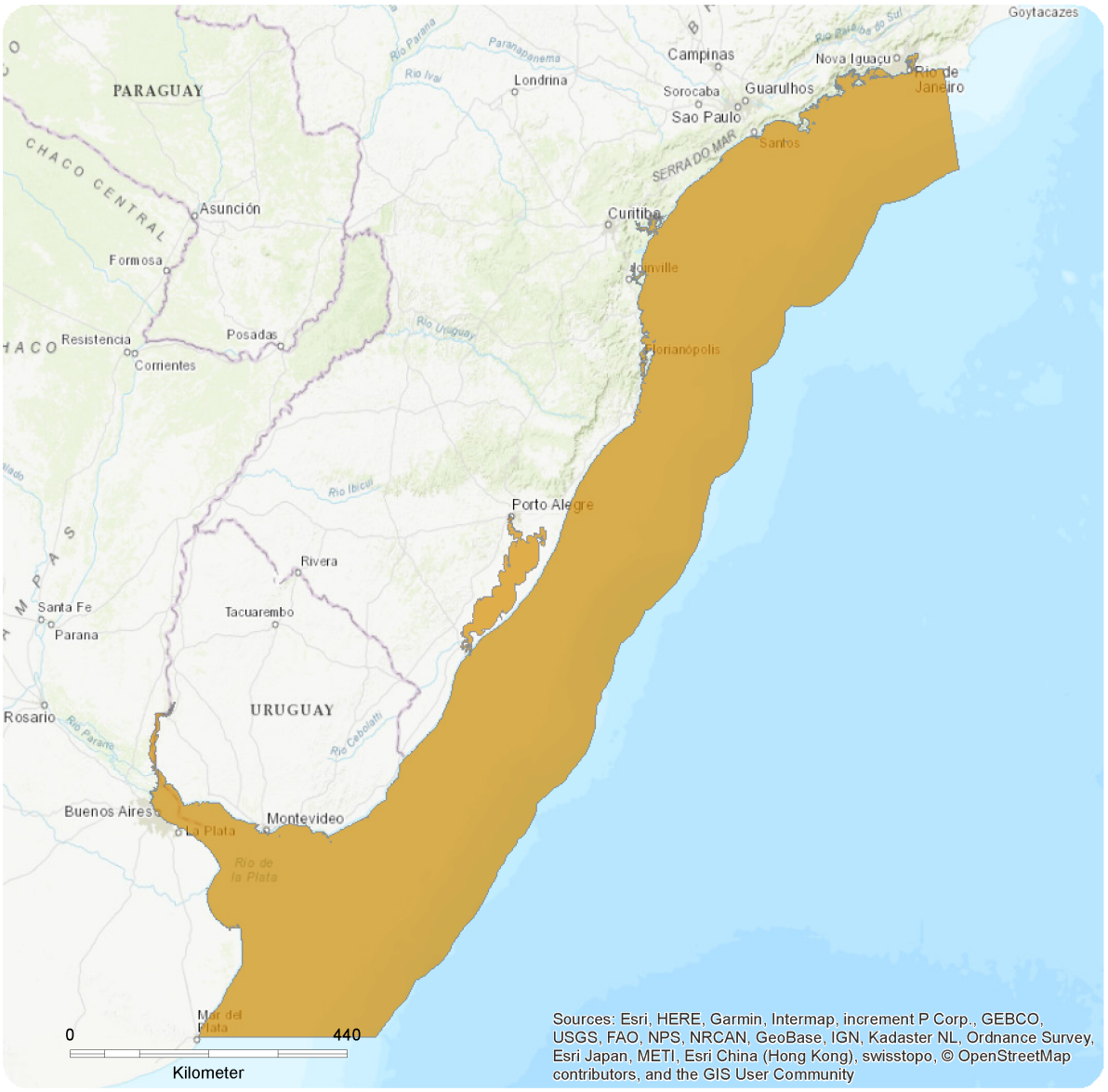
Native: Argentina; Brazil; Uruguay

FAO Marine Fishing Areas:

Native: Atlantic - southwest

Distribution Map

Squatina occulta

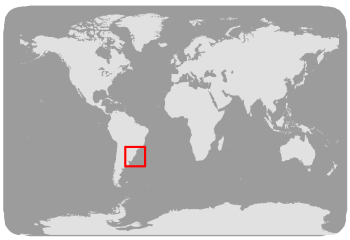


Range

Extant (resident)

Compiled by:

IUCN SSC Shark Specialist Group



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

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Population

Angel sharks in the Southwest Atlantic are notoriously difficult to distinguish and catches and landings are typically reported at the genus level. Unless otherwise stated the information below refers to the genus as a whole (i.e. combined catch or landings of all *Squatina* species that are native to the region).

Brazil

In the period from 1988 to 2002, on the continental shelf of Rio Grande do Sul, the abundance of *Squatina* species was reduced by approximately 85%, and bottom trawling continued to intensively exploit this population in the early 2000s (Miranda and Vooren 2003, Vooren and Klippel 2005). In São Paulo State, the gillnet fleet began directed fishing on *Squatina* species in 1997, collapsing during the year 2005 (Vooren and Klippel 2005). Angel shark stocks remain depleted as a result of ongoing incidental catch (Mafra Pio *et al.* 2016). In the same region (continental shelf of southern Brazil), scientific fishing cruises conducted between 1986 to 2001 using bottom trawls reveals that the frequency of occurrence and CPUE (in kg/hour and number of ind./hour) of this species (i.e. not aggregated *Squatina* spp.) underwent a reduction of approximately 80%, confirming trends observed in commercial fisheries (-85% between 1988 and 2002) (Vooren and Klippel 2005).

Argentinean-Uruguayan Common Fishing Zone (AUCFZ)

In Uruguay, angel sharks are caught by trawling on the platform and declared as "*angelito*". Annual catches by Uruguay of Argentinian, Angular, and Hidden Angelsharks combined were about 300 t in the years 1998-2001 (Paesch and Domingo 2003). The estimated capture has been 200 to 400 metric tons (MT) per year between 1997 and 2005. Between 1997 and 2010 the average of angel sharks declared landings was 277 t and decreased to 50 t in 2011 and 2012 to rise again to 170 t in 2013 (Domingo *et al.* 2015). There is no clear trend in the landings data from Uruguay from 1996 to 2018 (CTMFM 2018). There are no statistics by species, but during research surveys in the Argentinean-Uruguayan Common Fishing Zone (AUCFZ), Milessi *et al.* (2001) found that Angular Angelshark was the dominant species in the catch.

Argentinian landings in the AUCFZ underwent a reduction of 51% between 1996 and 2017, equivalent to a 78% reduction over three generation lengths (CTMFM 2018).

Argentina (south of the Argentinean-Uruguayan Common Fishing Zone)

Total captures of angel sharks in Argentina oscillated around 1,000 MT between 1979 and 1984 then increased to maximums of over 4,000 MT in the 1990s. In 1991 as much as 4,167 MT were taken, and 4,281 MT in 1996. Peaks were reached in 1997 and 1998, before landings dropped in 2002 to 2,000 MT, rising again in 2003 to 3,550 MT (Massa *et al.* 2004). Thus, there has been an overall negative trend in landings during the period 1998 to 2003 (Massa *et al.* 2004). Massa and Hozbor (2003) suggested a 58% reduction in the CPUE of angel shark in the coastal bottom trawl fleet, and this trajectory has continued since (although these fisheries there are thought to catch mostly Angular Angelshark; G. Chiaramonte unpubl. data 2018).

Overall, given reported past population reductions, ongoing heavy fishing pressure across its range, and its low productivity, the Hidden Angelshark is inferred to have undergone reductions of more than 80% over the past three generations (46.5 years).

Current Population Trend: Decreasing

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Habitat and Ecology (see Appendix for additional information)

The Hidden Angelshark is a medium-sized (to 160 cm total length; TL) demersal shark (Ebert *et al*. 2013). The species occurs at depths of 10-350 m; it is found most commonly throughout the year from 50 to 100 m from the mid- and outer continental shelf, and is scarce at depths of 10 to 20 m and from 100 to 350 m (Vooren and da Silva 1991).

Hidden Angelsharks are lecithotrophic viviparous. Males mature at 82 cm TL and females at 89 cm TL (Ebert *et al.* 2013). The breeding cycle of the females lasts at least two years. The gestation period is approximately 11 months, and young are born in spring. The breeding cycle of the female may take 4-5 years, with variation between individuals (Vooren and Klippel 2005). Uterine fecundity ranges from 4 to 10, with an average of 7 embryos, and the size at birth is 30 cm TL. Birth occurs in summer months, usually at depths of 60 to 80 m (Vooren and Klippel 2005). 100% sexual maturity occurs from the age of 10 years and the longevity is at least 21 years (Vooren and Klippel 2005). According to available data on longevity, reproductive ages and duration of the reproductive cycle, females may produce a maximum of five litters throughout an individual's reproductive life. This species has a calculated generation length of 15.5 years. Similar to other *Squatina* species, the Hidden Angelshark carries out its entire life cycle on the shelf, with no seasonal migrations between depths or regions reported. However, females may move to shallower (60-80 m) coastal waters to give birth (Vooren and Klippel 2005).

Systems: Marine

Use and Trade

Angel sharks, including this species, are caught and retained as valuable bycatch in trawl and gillnet fisheries. There are both directed and indirect fisheries that catch this species in Argentina and Brazil, while there is little direct fishing of the species in Uruguay, where it is mostly caught as bycatch. Angel shark meat is sold fresh or salted and dried for local consumption. In Brazil, the meat is marketed as *cação-anjo* and is typically more valuable than other shark meat which is simply known as *cação* (P. Dolphine unpubl. data 2018). Although it has been illegal to retain angel sharks in Brazil since 2004, the meat of this species does still show up in markets (Bornatowski *et al.* 2018, Almerón-Souza *et al.* 2018). Since 2000, Brazilian imports of shark meat have increased eight-fold (Dent and Clarke 2015). Furthermore, Brazil imports more than 90% of the production of *Squatina* spp. from Argentina (J.-M. Cuevas unpublished data). This indicates a growing market in Brazil and may indicate depletion of the domestic Brazilian portion of the population.

Threats (see Appendix for additional information)

The major threats to populations of Hidden Angelshark are bottom trawls and bottom-set gillnets.

Until 1989, bottom trawl gears targeting demersal fish mainly caught *Squatina* species in Brazil. Although this type of fishing gear continues to operate, from 1990 the introduction of bottom gillnets increased on the shelf and slope off southern Brazil, leading to an increase in the capture of angel shark species. Gillnets were reported as six times more effective at catching angel sharks than trawling alone (Vooren and Klippel 2005). This efficiency is due to two factors: first, the nocturnal behavior of the species determines the high vulnerability to night fishing with bottom gillnets; secondly, this fleet practices directed fishing of angel sharks with stretched mesh of 35 to 40 cm between opposing nodes. For these reasons, fishing with gillnets is the main threat to the remaining populations of *Squatina*

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species (Vooren and Klippel 2005). Although angel sharks were heavily targeted by these nets in the early 2000s, depletion has led them to be caught more infrequently and the targeted fishery is no longer profitable (Mafra Pio *et al.* 2016). Currently, the Itajaí fleet (Santa Catarina, Brazil) is responsible for most of the fishing effort on the South Platform. In 2007, in the port of Itajaí, 61% of the *Squatina* catches came from the bottom gillnet fleet, and 39% from bottom trawling. These two fishing modalities are the main extrinsic factors that affect the population of this species in Brazil (Miranda and Vooren 2003, Vooren and Klippel 2005).

Gravid females have been observed to abort embryos easily upon capture, further reducing the reproductive capacity (Vooren and Klippel 2005). A low rate of dispersal between populations also makes them especially prone to local depletion and means that recolonization will be extremely low.

In Uruguay, there is little direct fishing for angel sharks, but they are taken as bycatch in industrial and artisanal fisheries (Paesch and Domingo 2003).
In Argentina, Chiaramonte (1998) stated that *Squatina* species were the second most important fish landed by the gillnet fleet of Puerto Quequen (Buenos Aires Province), however this was mostly the Angular Angelshark.

Conservation Actions **(see Appendix for additional information)**

Retention of the Hidden Angelshark has been banned in Brazil since 2004, but the species is still caught illegally. In Brazil, there is no control of the shelf angel shark fishery, and although trawling in inshore waters is prohibited in some areas for some some periods, enforcement of this regulation is difficult. Because it is listed on the Brazil National Red List, the species is among the priorities of the Brazilian Action Plan for the Conservation of Marine Elasmobranchs. The species, however, was the target of fisheries in the 1980s and 1990s and never stopped being landed in Brazil (as target and bycatch). Recent data indicates that its occurrence in both landings and markets is still frequent (Bornatowski *et al.* 2018, Alméron-Souza *et al.* 2018). The species was evaluated in Brazil as over-exploited in 2004 (Ministério do Meio Ambiente 2004), Critically Endangered in 2011 (Vooren *et al.* 2018), and was re-evaluated again in 2017 as Critically Endangered (not yet validated), and was fully protected in Brazil as of 2014 by the normative instructions numbers 5 and 445.

In September 2018, the government of the state of Rio Grande do Sul approved a law that extends the range in which fishing with trawls is prohibited. With the sanction and regulation of the law, the protected area will be increased from 3 nautical miles (5.5 km) offshore to 12 nautical miles (22.2 km) offshore.

Nursery areas of the species have not been found in southern Brazil and may exist further south off Uruguay and/or Argentina. A new abundance estimate in southern Brazil is urgently needed after almost a decade of no-take protection in the country. At the same time an assessment of the relative composition of each species in commercial landings in each country is needed.

There is only one specifically managed fishing area for chondrichthyans in the Argentine Sea and it is located inside the Argentina and Uruguay Common Fishing Zone between 36° and 37° S. This coastal area of about 4,562 km^2 is closed from October to March and protects diverse species and reproductive stages of demersal and benthic chondrichthyans (Colonello *et al.* 2014), including angel sharks. The total amount of days changes between years and it is applied to all types of vessels using

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bottom net trawling.

The Total Allowable Catch (TAC) for chondrichthyans in the Argentinean-Uruguayan Common Fishing Zone (AUCFZ) is regulated by the Binational Technical Comision (*Comisión Técnica Mixta del Frente Marítimo*). Only 3 groups are regulated by a TAC limit each year: the smoothhound *Mustelus schmitti*, the angel sharks *Squatina* spp. and skates (Rajiformes). The TAC for angel sharks was constant between 2012 and 2016 (2,600 tonnes) and only in 2012 was this exceeded, with a total catch of 2709.2 t for Argentina and 27 t for Uruguay.

Since 1992 there is a Maximum Permitted Catch (MPC) for angel sharks in Argentinian waters south of the AUCFZ, which was 6,000 MT in the years 1995 to 1999 and thereafter was reduced to 4,000 MT (Massa *et al.* 2003). However, these MPC values are not respected: 4230 MT were taken in 2006, 4294 MT in 2007, 5214 MT in 2008, 5064 MT in 2009, 5277 MT in 2010 and 4509 MT in 2011 (Fisheries statistics published by the Undersecretariat of Fisheries and Aquaculture of the Argentine Republic (http://www.minagri.gob.ar/site/pesca/pesca_maritima/02-desembarques/ins).
Molecular markers of *Squatina* spp. have been determined for future identification of these species in local markets (Falcão *et al.* 2014).

Research and monitoring of population size and landings are needed across this species' range.

Although the Argentine and Angular Angelsharks were assessed by the US National Oceanic and Atmospheric Administration in 2015 (Casselberry and Carlson 2015) and later listed as Endangered under the US Endangered Species Act in 2017, this species was not assessed or considered for inclusion under the Act.

Credits

Assessor(s): Awruch, C.A., Barreto, R., Charvet, P., Chiaramonte, G.E., Cuevas, J.M., Dolphine, P., Faria, V., Paesch, L. & Rincon, G.

Reviewer(s): Kyne, P.M. & Pollom, R.

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Facilitators(s) and Compiler(s): Pollom, R.

Bibliography

Almerón-Souza, F., Sperb, C., Castilho, C.L., Figueiredo, P.I., Gonçalves, L.T., Machado, R., Oliveira, L.R., Valiati, V.H. and Fagundes, N.J. 2018. Molecular identification of shark meat from local markets in Southern Brazil based on DNA barcoding: Evidence for mislabeling and trade of Endangered species. *Frontiers in Genetics* 9.

Bernardes, R.Á., de Figueiredo, J.L., Rodrigues, A.R., Fischer, L.G., Vooren, C.M., Haimovici, M. and Rossi-Wongtschowski, C.L.D.B. 2005. *Peixes de Zona Econômica Exclusiva da Região Sudeste-Sul do Brasil: Levantamento com armadilhas, pargueiras e rede de arrasto de fundo*. Editora da Universidade de São Paulo, São Paulo.

Bornatowski, H., Braga, R.R. and Barreto, R.P. 2018. Elasmobranchs consumption in Brazil: impacts and consequences. In: Rossi-Santos, M.R. and Finkl, C.W. (eds), *Advances in Marine Vertebrate Research in Latin America*, pp. 251-262. Springer International Publishing.

Carvalho, M.R. de, Faro, C. and Gomes, U.L. 2012. Morphological and taxonomic revision of species of *Squatina* from the Southwestern Atlantic Ocean (Chondrichthyes: Squatiniformes: Squatinidae). *Acta Zoologica* 93(2): 171-183.

Casselberry, G.A. and Carlson, J.K. 2015. Endangered Species Act Status Review of the Argentine angel shark (*Squatina argentina*). Report to the National Marine Fisheries Service, Office of Protected Resources. National Oceanic and Atmospheric Administration (NOAA), Panama City, Florida. 18 pp.

Chiaramonte, G.E. 1998. Shark fisheries in Argentina. *Marine and Freshwater Research* 48: 601-609.

Colonello, J., Cortés, F. and Massa, A. 2014. Species richness and reproductive modes of chondrichthyans in relation to temperature and fishing effort in the Southwestern Atlantic Shelf (34-54 S). *Fisheries Research* 160: 8-17.

CTMFM (Comisión Técnica Mixta del Frente Marítimo). 2018. Estadística Pesquera Desembarques en el Área del Tratado. Available at: http://www.ctmfm.org/archivos-de-captura/. (Accessed: 07 September 2018).

Dent, F. and Clarke, S. 2015. State of the global market for shark products. FAO Fisheries and Aquaculture Technical Paper No. 590. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. 187 pp.

Domingo, A., Forselledo, R. and Jimenez, S. (Eds.). 2015. Revision de planes de accion nacional para la conservacion de aves marinas y condrictios en las pesquerias uruguayas. MGAP-DINARA, Montevideo, Uruguay.

Ebert, D.A., Fowler, S. and Compagno, L. 2013. *Sharks of the World. A Fully Illustrated Guide*. Wild Nature Press, Plymouth, United Kingdom.

Estalles, M.L., Chiaramonte, G.E., Faria, V.V., Luzzatto, D.C. and Astarloa, J.M.D. de. 2016. The southernmost range limit for the hidden angelshark *Squatina occulta*. *Marine Biodiversity Records* 9: 58.

Falcão, L.H.O., Furtado-Neto, M.A.A., Maggioni, R. and Faria, V.V. 2014. Prospective molecular markers for the identification of illegally traded angelsharks (*Squatina*) and dolphin (*Sotalia guianensis*). *Genetics and Molecular Research* 13(4): 9710-9717.

Faria, V.V., Chiaramonte, G.E. and van Oijen, M.J.P. 2014. Publication date and author spelling for the hidden angelshark *Squatina occulta*. *Journal of Fish Biology* 84: 1185-1187.

IUCN. 2019. The IUCN Red List of Threatened Species. Version 2019-1. Available at: www.iucnredlist.org.

(Accessed: 21 March 2019).

Mafra Pio, V., Pezzuto, P.R. and Wahrlich, R. 2016. Only two fisheries? Characteristics of the industrial bottom gillnet fisheries in southeastern and southern Brazil and their implications for management. *Latin American Journal of Aquatic Research* 44(5): 882- 897.

Massa A. and Hozbor N. 2003. Peces cartilaginosos de la Plataforma argentina, explotación, situación y necesidades para un manejo pesquero adecuado. *Frente Marítimo*. 19(B): 199-206.

Massa, A., Hozbor, N., Lucifora, L. and Colonello, J. 2003. Sugerencias de capturas para el año 2003 de gatuzo (*Mustelus* spp.), peces angel (*Squatina* spp.) y rayas costeras. Informe Técnico Interno INIDEP, DNI N° 47. Mar del Plata: INIDEP, 13 pp.

Massa, A.M., Hozbor, N.M. and Colonello, J.H. 2004. Situación actual y avances en el estudio de los peces cartilaginosus. Informes Técnicos Internos DNI-INIDEP N°57/04.

Milessi, A.C., Vogler, R. and Bazzino, G. 2001. Identificación de tres especies del género *Squatina* (CHONDRICHTHYES, SQUATINIDAE) en la Zona Común de Pesca Argentino-Uruguaya (ZCPAU). *Gayana (Concepc.)* 65: 167-172.

Ministério do Meio Ambiente. 2004. Lista Nacional das Espécies de Invertebrados Aquáticos e Peixes Ameaçadas de Extinção. Instrução Normativa No. 5 de 21 Maio 2004. Diário Oficial da União – Seção 1. Brasília.

Miranda L.V. and Vooren C.M. 2003. Captura e esforço da pesca de elasmobrânquios demersais no sul do Brasil nos anos de 1975 a 1997. *Frente Marítimo* 19B: 217–231.

Paesch, L. and Domingo, A. 2003. La pesca de condrictios en el Uruguay. *Comisión Técnica Mixta del Frente Marítimo* 19: 207-216.

Perez, J.A.A., Pezzuto, P.R., Andrade, H.A., Schwingel, P.R., Rodrigues-Ribeiro, M. and Wahrlich, R. 2002. O ordenamento de uma nova pescaria direcionada ao peixi-sapo (*Lophius gastrophysus*) no sudeste e sul do Brasil. *Notas Téc. Facimar* 6: 65-83.

Silva, K.G. da. 1996. Estudo comparativo dos parâmetros populacionais da reproduçao dos caçoes–anjo *Squatina argentina* Marini, 1930, *Squatina guggenheim* Marini, 1936 e *Squatina occulta* Vooren & Silva, 1991, no sul do Brasil. Rio Grande, Fundaçao Universidade do Rio Grande. (Unpublished MsSc. Thesis).

Soto, J.M.R. 2001. Annotated systematic checklist and bibliography of the coastal and oceanic fauna of Brazil. I. Sharks. *Mare Magnum* 1(1): 51-120.

Stelbrink, B., von Rintelen, T., Cliff, G. and Kriwet, J. 2010. Molecular systematics and global phylogeography of angel sharks (genus *Squatina*). *Molecular Phylogenetics and Evolution* 54: 395-404.

Vaz, D.F.B. and de Carvalho, M.R. 2013. Morphological and taxonomic revision of species of *Squatina* from the Southwestern Atlantic Ocean (Chondrichthyes: Squatiniformes: Squatinidae). *Zootaxa* 3695: 81 pp.

Vieira, C.E.B. 1996. Dinâmica populacional e avaliação de estoques de cações-anjo *Squatina guggenheim* Marini 1936 e *S. occulta* Vooren & Silva 1991 na plataforma continental do sul do Brasil. Fundação Universidade do Rio Grande.

Vooren, C.M. and da Silva, K.G. 1991. On the taxonomy of the angel sharks from southern Brazil, with the description of *Squatina occulta* sp. n. *Revista Brasileira de Biologia* 51: 589-602.

Vooren, C.M. and Klippel, S. 2005. Biologia e status de conservação dos cações-anjo *Squatina guggenheim, Squatina occulta* and *Squatina argentina*. In: C.M. Vooren and S. Klippel (eds). *Ações para*

a conservação d e tubarões e raias no sul do Brasil, pp. 57-82. Porto Alegre: Igaré.

Vooren, C.M., Montealegre-Quijano, S., Lessa, R.P., Barreto, R.R., Soto, J., Kotas, J.E. and Aguiar-dos-Santos, R. 2018. *Squatina occulta*. *Livro Vermelho da Fauna Brasileira Ameaçada de Extinção*, ICMBio Diretoria de Pesquisa, Avaliação e Monitoramento da Biodiversidade Coordenação Geral de Estratégias para Conservação, Brasilia, Brasilia, Brazil.

Citation

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External Resources

For Images and External Links to Additional Information, please see the Red List website.

Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
9. Marine Neritic -> 9.4. Marine Neritic - Subtidal Sandy	Resident	Suitable	-
9. Marine Neritic -> 9.5. Marine Neritic - Subtidal Sandy-Mud	Resident	Suitable	-
9. Marine Neritic -> 9.6. Marine Neritic - Subtidal Muddy	Resident	Suitable	-

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timing	Scope	Severity	Impact Score
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.2. Intentional use: (large scale) [harvest]	Ongoing	Whole (>90%)	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.7. Reduced reproductive success		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	Whole (>90%)	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.7. Reduced reproductive success		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.4. Unintentional effects: (large scale) [harvest]	Ongoing	Whole (>90%)	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.7. Reduced reproductive success		

Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Actions in Place
In-Place Research, Monitoring and Planning
Action Recovery plan: No
Systematic monitoring scheme: No

http://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T39331A2899669.en

Conservation Actions in Place
In-Place Land/Water Protection and Management
Conservation sites identified: No
Occur in at least one PA: Unknown
Area based regional management plan: No
Invasive species control or prevention: Not Applicable
In-Place Species Management
Harvest management plan: Yes
Successfully reintroduced or introduced beningly: No
Subject to ex-situ conservation: No
In-Place Education
Subject to recent education and awareness programmes: No
Included in international legislation: No
Subject to any international management/trade controls: No

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Actions Needed
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management
5. Law & policy -> 5.1. Legislation -> 5.1.1. International level
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level
5. Law & policy -> 5.1. Legislation -> 5.1.3. Sub-national level
5. Law & policy -> 5.2. Policies and regulations
5. Law & policy -> 5.3. Private sector standards & codes
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.1. International level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology

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Research Needed
1. Research -> 1.5. Threats
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
2. Conservation Planning -> 2.2. Area-based Management Plan
2. Conservation Planning -> 2.3. Harvest & Trade Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.2. Harvest level trends
3. Monitoring -> 3.3. Trade trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Lower depth limit (m): 350
Upper depth limit (m): 10
Population
Continuing decline of mature individuals: Unknown
Extreme fluctuations: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: No
Generation Length (years): 15.5

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The IUCN Red List Partnership

The IUCN Red List of Threatened Species™ is produced and managed by the IUCN Global Species Programme, the IUCN Species Survival Commission (SSC) and The IUCN Red List Partnership.

The IUCN Red List Partners are: Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.