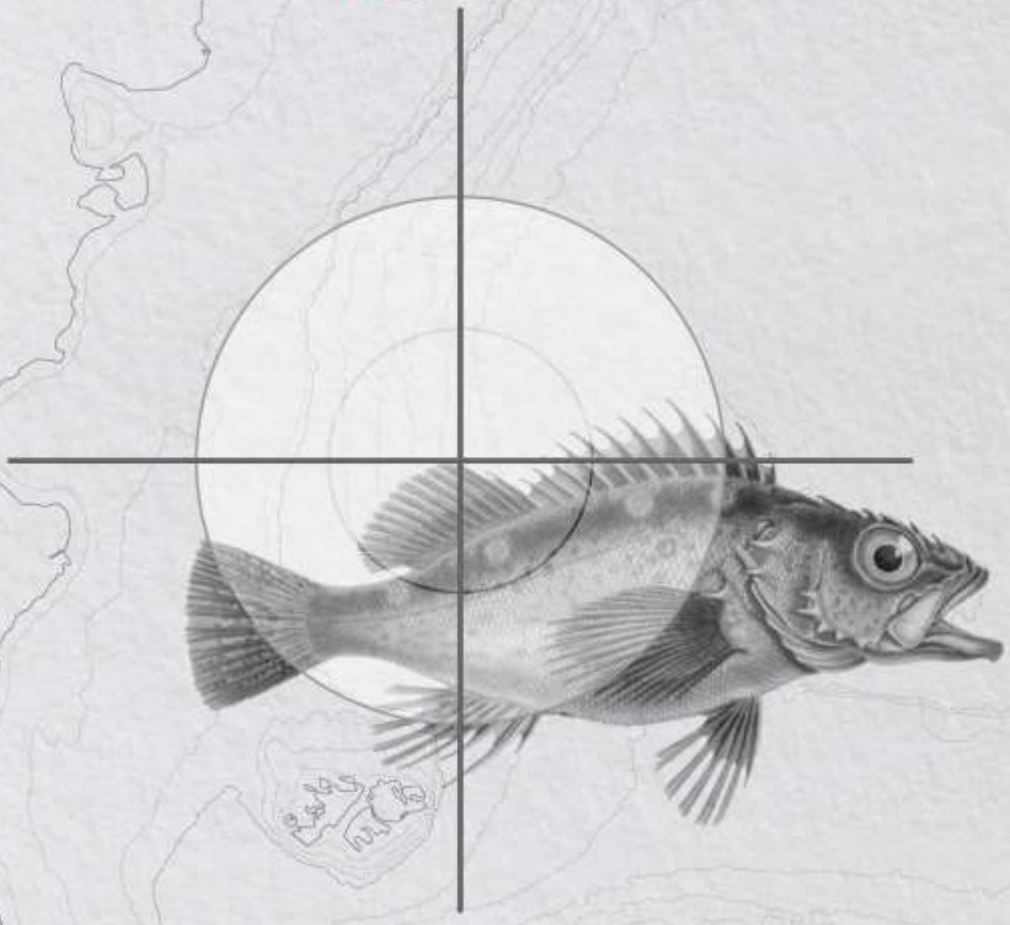
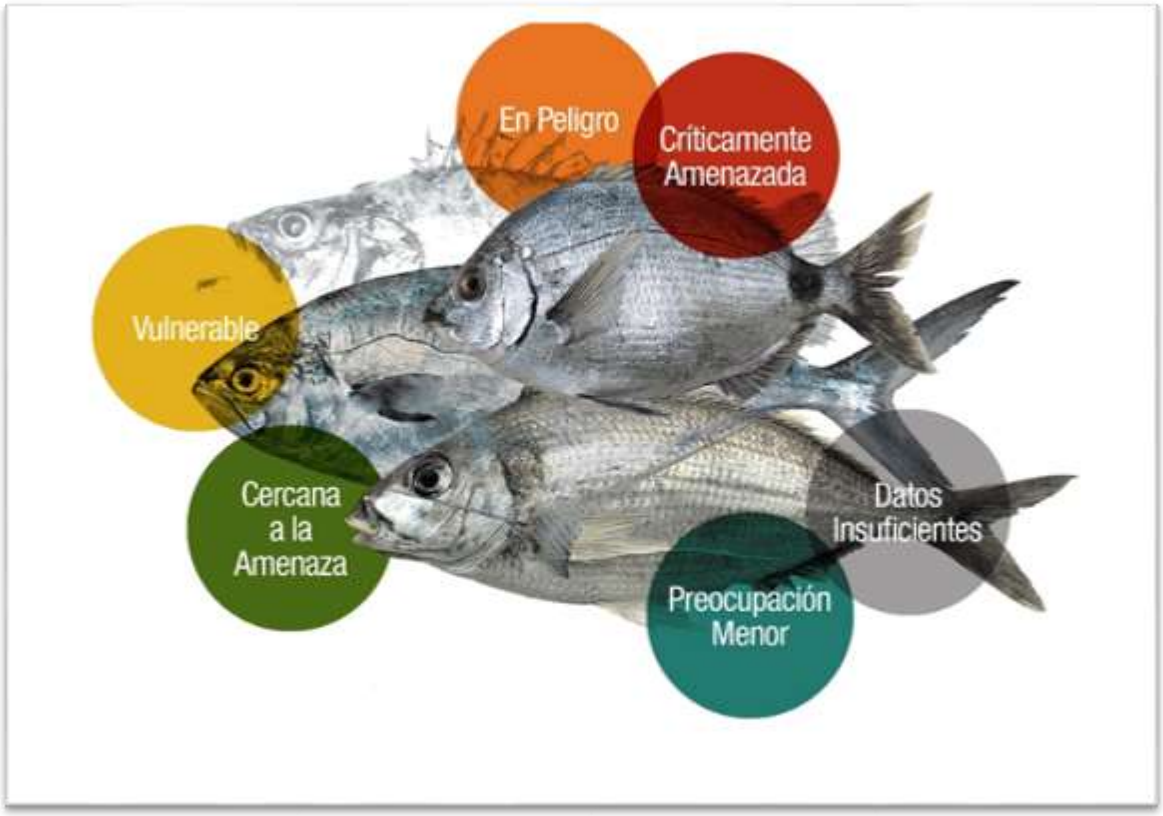
Foro para la Conservación
del Mar Patagónico
y Áreas de Influencia

PECES ÓSEOS

RED LIST



Primer Taller Regional de
EVALUACIÓN DEL ESTADO DE CONSERVACIÓN DE ESPECIES
para el MAR PATAGÓNICO según criterios de la Lista Roja de UICN



Taller Regional de Evaluación del Estado de Conservación de Especies para el Mar Patagónico según criterios de la Lista Roja de UICN: PECES ÓSEOS. Buenos Aires, ARGENTINA – Diciembre 2019

Results of the 2019 IUCN Regional Red List Workshop for Species of the Patagonian Sea: BONY FISHES.

Agosto 2020

Con el apoyo de:

WCS

Foro para la Conservación del Mar Patagónico y Áreas de Influencia

OCEANS5

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Buratti, C., Díaz de Astarloa, J.M., Falabella, V., Hüne, M., Irigoyen, Al; Landaeta, M., Linardich, C., Riestra, C., Vieira, J. Campagna, C. 2020. Informe del Taller Regional de Evaluación del Estado de Conservación de Especies para el Mar Patagónico según criterios de la Lista Roja de UICN: Peces óseos. Foro para la Conservación del Mar Patagónico y áreas de influencia. 117 pp.

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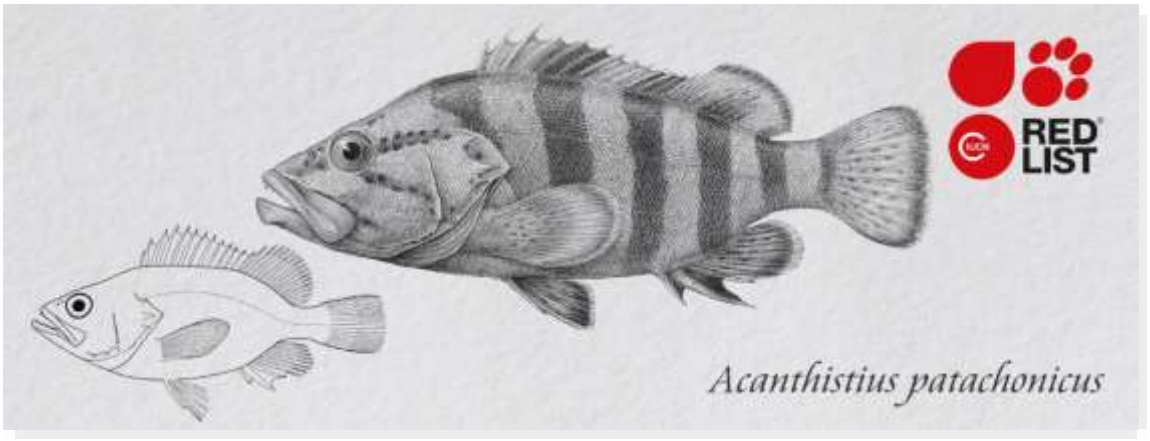
Buratti, C., Díaz de Astarloa, J.M., Falabella, V., Hüne, M., Irigoyen, Al; Landaeta, M., Linardich, C., Riestra, C., Vieira, J. Campagna, C. 2020. Informe del Taller Regional de Evaluación del Estado de Conservación de Especies para el Mar Patagónico según criterios de la Lista Roja de UICN: Peces óseos. Foro para la Conservación del Mar Patagónico y áreas de influencia. 117 pp.

INDICE:



DD – Data Deficient, (IUCN version 3.1)

Assessment Rationale:

This rocky reef species has a relatively small range from southern Brazil to central Argentina. It is long-lived and the estimated generation length is 28.5 years. Large commercial fisheries targeted spawning aggregations of this species in the 1980s and 1990s until abundance steeply declined to the point where the market was no longer viable and at least four large areas where spawning aggregations were heavily depleted. Currently, it continues to be targeted by artisanal and industrial fisheries. The implementation of effective fishing area closures, both permanent and seasonal, in the El Rincón area is considered to provide a high level of protection for half of the global population of this species. According to fisher interviews, some level of population decline occurred within the past 40 years, or over a little more than one generation length ago. The lack of fisheries data, including a stock assessment, and the low level of understanding of the status of historical and current spawning aggregations prevents the estimation of percent population decline at this time. A secondary threat may be the reduction of habitat quality due to the invasive alga *Undaria pinnatifida* on shallow reefs, which has spread through much of its range. It is listed as **Data Deficient** with a strong recommendation to improve fishery monitoring and to conduct studies on spawning aggregations.

Assessor(s): Irigoyen, A., Riestra, C., Buratti, C., Díaz de Astarloa, J., Hüne, M., Landaeta, M. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

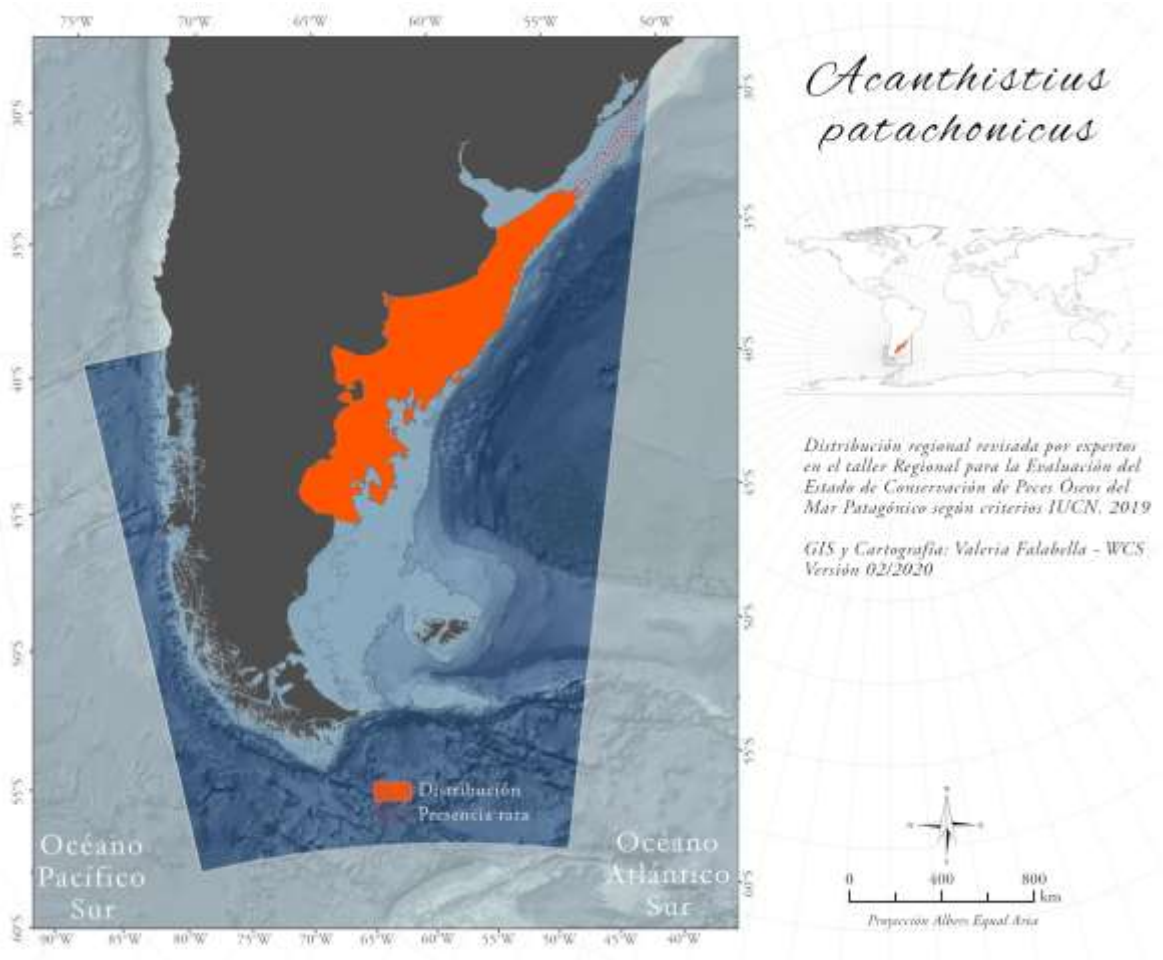
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - SERRANIDAE - Acanthistius - patachonicus (Jenyns, 1840)

Common Names: Patagonian Grouper (English), Mero (Spanish; Castilian)
Taxonomic Note: This species was previously considered a junior synonym of *Acanthistius brasilianus* (Irigoyen *et al.* 2008, Irigoyen *et al.* 2010).

Geographic Range



This species is endemic to the Patagonia Sea region. It occurs from 23°S off southern Brazil to 48°S slightly south of the San Jorge Gulf in Argentina. In Brazil, the species is rare and its occurrence is associated with the Malvinas Current (Figueiredo and Menezes 1980, Carvalho-Filho 1999, Irigoyen *et al*. 2008). The depth range is 0-130 metres. This species is confused with *Acanthistius brasilianus* in the literature.

Population

This species can be locally abundant in Argentina, including the San Matías Gulf to Comodoro Rivadavia and the northern coast around 38º S. Its maximum abundance is between 40º to 45ºS. It is very rare in southern Brazil (Figueiredo and Menezes 1980, Carvalho-Filho 1999, Irigoyen *et al*. 2008). According to interviews of captains, spawning aggregations were directly targeted by very large commercial fishing vessels in the 1980s and 1990s and the fish were exported to Nigeria. Due to overexploitation, four large areas where spawning aggregations occur were heavily depleted and the market then ceased to exist. The total number of spawning aggregations that existed prior to targeted fishing is not known. In addition, the remaining existence or status of spawning aggregations is poorly understood due to the lack of scientific investigation. No stock assessments have been conducted. Catch of this species in the Mar del Plata trap fishery was stable from about 1996 to 2011. In the present day, artisanal and industrial fishing fleets continue to target this species. From 1986 to 2020, an average of 45 t of this species per spawning season were taken by an artisanal wicker trap fishery in Claromecó. According to interviews of industrial fishers (mostly trawlers), catch per unit effort declined over the past 40 years, or since the 1980s. According to long term data collected during recreational angling competitions, catch per unit effort of this species has declined over time (Venerus and Cedrola 2017). The steepest population decline likely occurred in the 1980s, but the collection of fishery data did not begin until 1996, and the lack of population data does not allow for an estimation of percent decline at this time. Due to effective fishing area closures in El Rincón, about 50% of its global population is considered well-protected. Overall, fishing effort in the coastal, commercial fisheries has declined since the implementation of fishing regulations in 2009 and 2010. According to fishery independent surveys conducted in the El Rincón area from 1994 to 2012, density of this species declined over time, but some increases were recorded from 2008 to 2012 (Ruarte *et al*. 2017).

Habitats and Ecology

This demersal species inhabits nearshore rocky reefs. It forms seasonal spawning aggregations near reef. The maximum total length is 65 cm (Irigoyen *et al*. 2008). It primarily consumes polychaetes, crabs and fishes (Galván *et al*. 2009). Longevity is at least 48-50 years and length and age at first maturity is about length of first maturity is 29 cm and 8 years (Dell'Arciprete ***et al***. 1987, Cornejo *et al*. 2013, C. Riestra pers. comm. 2020). An estimate of natural mortality is not yet available. When applying an age at first reproduction of 8 years and longevity of 49 years, its estimated generation length is 28.5 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

This species is targeted by artisanal, industrial and recreational fishers. It is taken by trawling, trap and long line and recreationally by hook and line and spear fishing (Irigoyen *et al*. 2008). It is also taken as bycatch in red shrimp (*Pleoticus muelleri*) trawl fisheries and fisheries targeting the Argentine hake (*Merluccius hubbsi*) (MAGyP 2020). It is taken as part of the multi-species and multi-fleet coastal fisheries of Argentina (Ruarte *et al*. 2017).

Threats

Overfishing is a major threat to this species. The invasive, non-native alga *Undaria pinnatifida* has been found to reduce the quality of rocky reef habitat and reduced abundance of this species has been observed in areas with high densities of this algae (Irigoyen *et al*. 2011).

Conservation

In El Rincón, one area is closed to fishing in spring and summer (Resolution Consejo Federal Pesquero N° 27/2009 and N° 2/2010). There is a second, permanently closed area to bottom trawling in the southern part in place since 1997, and over the years, the closed area has increased in size (Consejo Federal Pesquero Resolution Nº 6/1997 y la Disposición Provincial S.P. N° 136/1997;Res. SAGPyA N° 484/2004 -; Res. SAGPyA N° 972/2004, Res. SAGPyA 90/2005; Res. CFP N° 26/2009; Res. CFP N°9/2014; Res. CFP N° 10/2017; Res.CFP N° 7/2018). This is considered to cover 50% of its global population. In Buenos Aires Province, recreational fishing regulations includes a daily bag limit for capture of this species (Venerus and Cedrola 2017).

Research needs include mapping and determining the status of spawning aggregations. At least one study is underway to investigate aggregations in El Rincón. It is also recommended to improve collection of fishery statistics, including the artisanal fishery catches in Buenos Aires and recreational fishing catches, and to conduct a stock assessment. INIDEP researchers currently have studies underway on the fishery and life history of this species.

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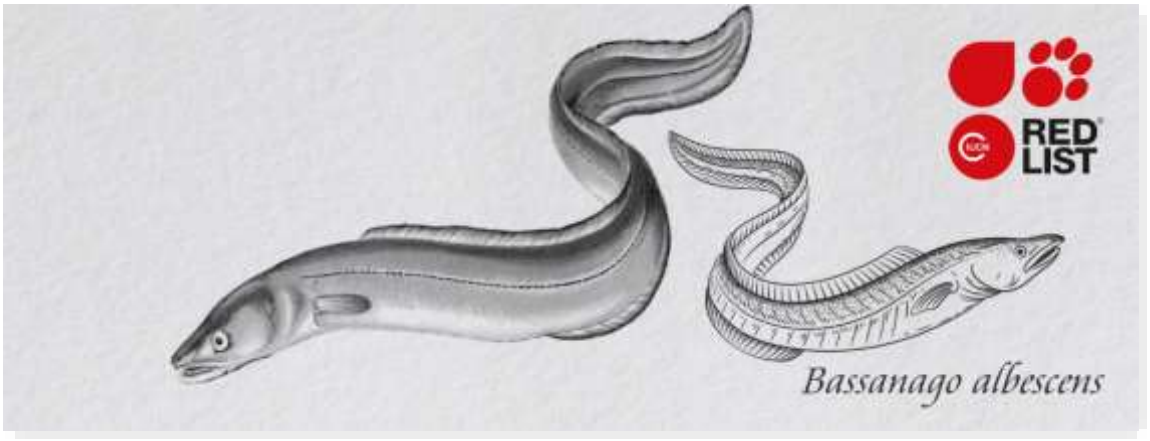


LC – Least concern, (IUCN version 3.1)

Assessment Rationale:

This deep-living species is widely distributed in the Patagonian Sea and is common and abundant in parts of this region. It is discarded as bycatch in deep longline and bottom trawl fisheries, but remains abundant in parts of its range, and fishing activity is not expected to be driving population declines approaching a Near Threatened or threatened level at this time; therefore, it is listed as **Least Concern**.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

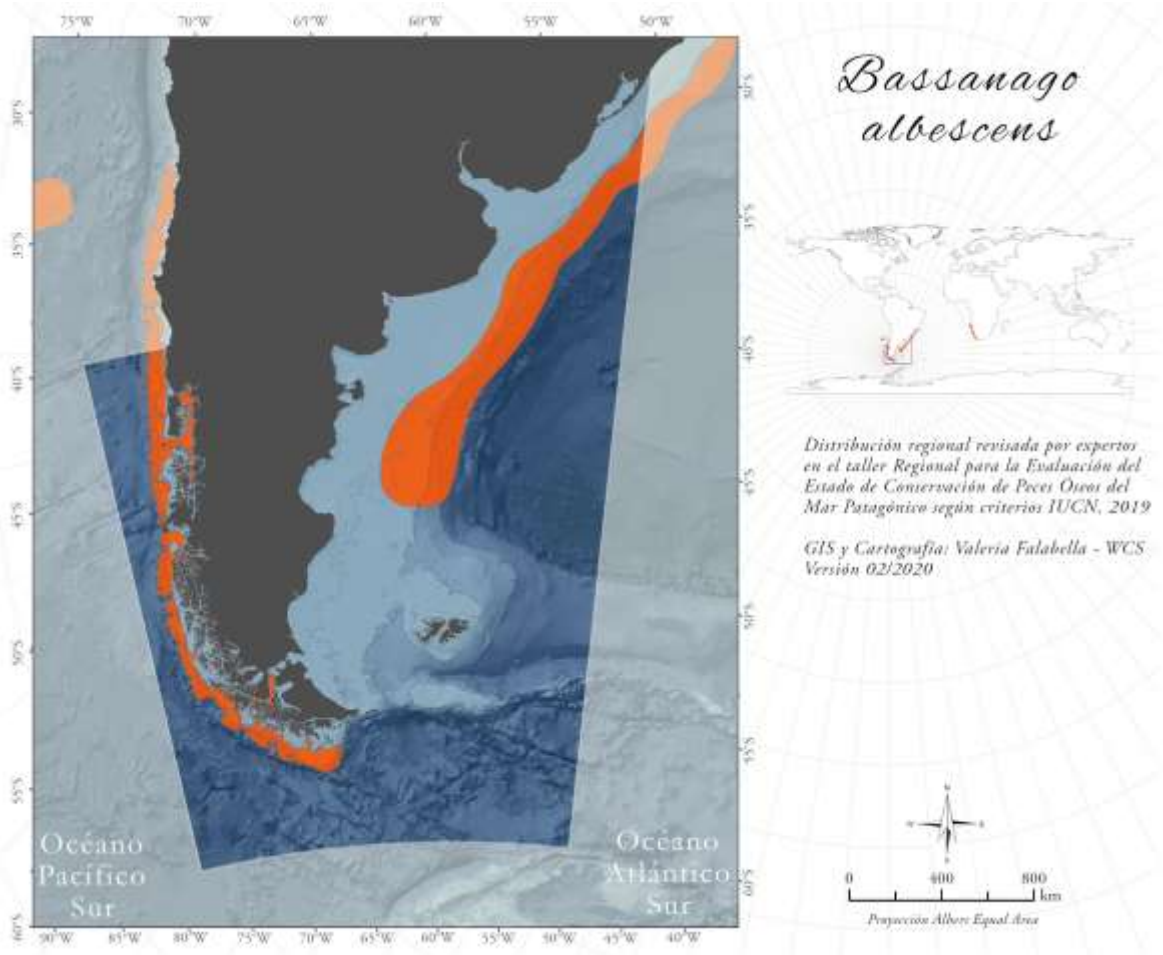
Facilitators/Compilers: Linardich, C., Falabella, V. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - ANGUILLIFORMES - CONGRIDAE - Bassanago - albescens (Barnard, 1923)

Common Names: Hairy Conger (English), congrio de profundidad (Spanish, Prenski and Scarlato 2000), congrio plateado (Spanish).

Geographic Range



This species is widely distributed in the Patagonian Sea. It occurs in the Pacific off Chile from 33°S to the southern tip and in the western Atlantic from Rio de Janeiro, Brazil to about 45°S off Argentina. It also occurs in the eastern Atlantic off Namibia and South Africa (Mabragana *et al.* 2011, Nion and Meneses 2016). The depth range is 270-2,000 metres (Shcherbachev 1987, M. Hüne pers. comm. 2019).

Population

This species is common and abundant off Argentina on the continental shelf break and upper slope and possibly elsewhere within the Patagonian Sea (J.M. Díaz de Astarloa and C. Buratti pers. comm. 2019).

Habitats and Ecology

This bathydemersal species typically occurs on the continental shelf break and slope (Figueiredo et al. 2002). Preferred temperature: 2.5-9.6 ° C (Kaschner *et al.* 2016). Diet includes isopods, cephalopods and echinoderms (Izzo 2010). Trophic level: 3.9 (Izzo 2010). Low resilience, with minimum population doubling time between 4.5 -14 years (Froese *et al.* 2017).

General Use and Trade Information

This species has no commercial value in the Patagonia Sea. In southern Argentina, it is frequently discarded as bycatch in the Argentine Hake (*Merluccius hubbsi*) bottom trawl fishery and the scallop fishery (C. Buratti pers. comm. 2019). It infrequently (about 3 to 6 individuals per season) occurs as bycatch in the austral hake (*Merluccius australis*) and golden kingklip (*Genypterus blacodes*) fisheries in Chile (M. Hüne pers. comm. 2020). It apparently has a relatively high survival rate when discarded after capture (J.M. Díaz de Astarloa pers. comm. 2019).

Threats

Bycatch from fishing activity is not expected to be driving region-level declines approaching Near Threatened or threatened in the Patagonia Sea at this time.

Conservation

There are no species-specific conservation measures.

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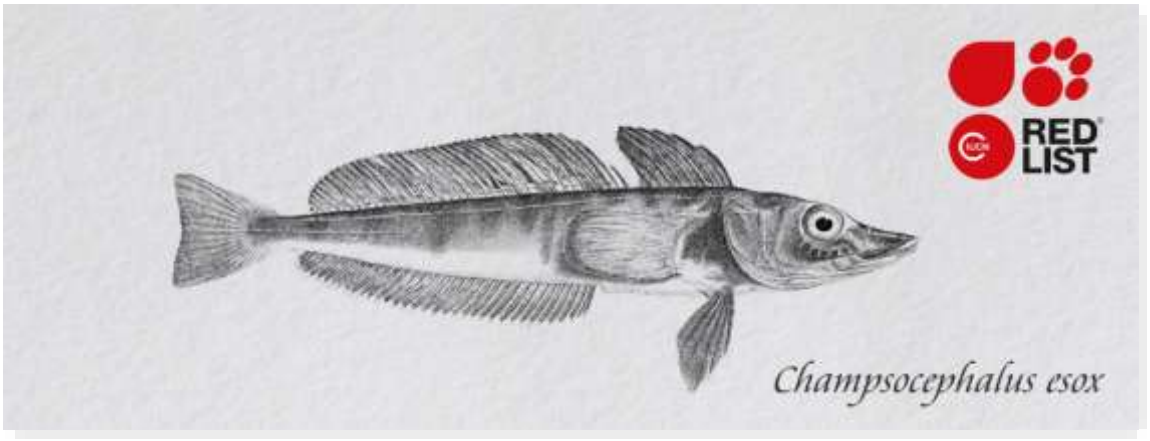


VU – Vulnerable, (IUCN version 3.1)

Assessment Rationale:

This demersal species is endemic to the southern Patagonia Sea region where it occurs in kelp forests and fjords. Its physiology restricts it to waters of high oxygen concentration and low temperature, and its survivability is reduced when these conditions fluctuate. Based on survey data and observations of fishers catch, this species has declined by 80% since the 1980s in at least half of its range (the Chilean coast). The status of its population in the other half of its range (Argentina) is poorly understood due to the lack of surveys. Considering the uncertainty regarding its status in the other half of its range, it is conservatively suspected to have declined overall by 30% over the past three generation lengths (12-18 years). Threats include climate change (warming water temperatures), mortality as bycatch in artisanal fisheries and invasive salmon. It is listed as **Vulnerable A2bcde**. Additional survey work is needed to monitor and understand its population throughout its range. Research is needed on its life history and response to heat shock.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

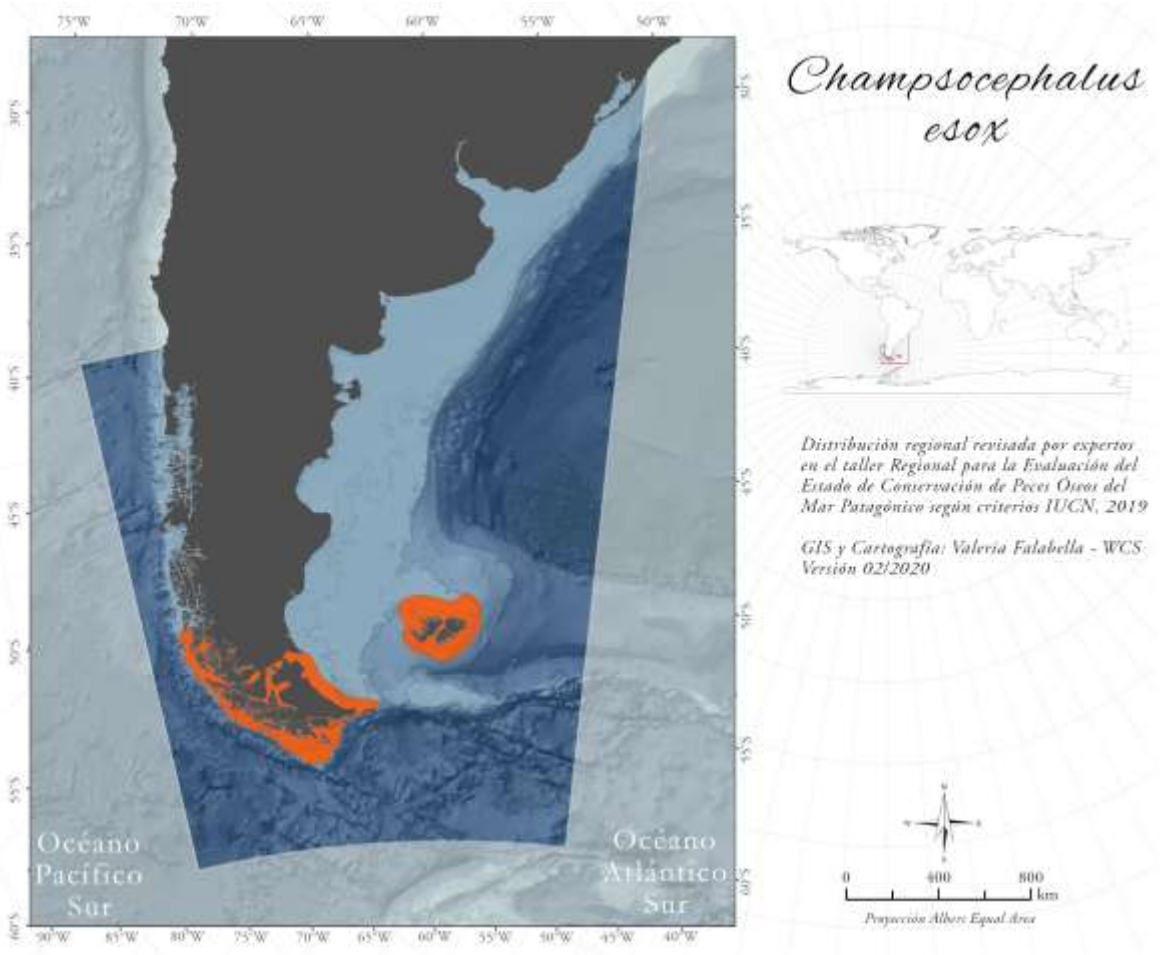
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - CHANNICHTHYIDAE - Champsocephalus – esox

Common Names: Pike Icefish (English), Pez Hielo (Spanish; Castilian)
Synonyms: Chaenichthys esox Günther, 1861

Geographic Range



This species is endemic to the Patagonia Sea region. It occurs from 50°S on the eastern Pacific coast of Chile to Cape Horn and on the Atlantic coast of Argentina from Cabo Virgenes to the Beagle Channel, including Isla de los Estados and the Malvinas Islands (M. Hüne pers. comm. 2019). Records further south off Antarctica represent waifs and records from the South Georgia Islands should be attributed to *Champsocephalus gunnari* (M. Landaeta pers. comm. 2019). The depth range is 0-250 metres (Eastman 2017).

The estimated area of occupancy (AOO) is 140,000 km^2 and the estimated extent of occurrence (EOO) is 400,000 km^2.

Population

This species is not common. It has not been well-studied on the Atlantic coast of Argentina or in the Malvinas, but is present there, though it is uncommon. It has not been commonly observed during surveys in the Magellan Strait area, but this may be due to its nocturnal behaviour. It was occasionally caught during sampling by setting traps and nets at night in the early 1990s in the Beagle Channel. In 2014 and 2015, no larvae of this species were found in the Beagle Channel (Bruno *et al.* 2018). It may have been more abundant in the past. According to survey data and observations of fisher catches in Puerto Natales, in the 1980s, it declined from 49 individuals observed to 8 individuals and it declined from 10 individuals observed to 2 individuals in 1999-2000, which represents an 80% decline over the past 30 years (M. Hüne pers. comm. 2019).

Habitats and Ecology

This benthic and benthopelagic species inhabits kelp forests and parts of fjords where salinity is low. It primarily consumes other fish (Hüne *et al.* 2018). The absence of hemoglobin in its blood restricts the species to waters with high oxygen concentrations and cold temperatures, and it does not easily tolerate changes in environmental conditions (Egginton *et al.* 2002, Grove *et al.* 2004, Eastman 2013). The maximum length is 35 cm and the length at first maturity is 20 cm. It has a low fecundity and late maturity (Calvo *et al*. 1999). Age at first maturity and longevity are not known. *Champsocephalus gunnari* is not an appropriate direct proxy for estimating generation length because it grows to twice the size (60 cm) of *C. esox*. The longevity of *C. gunnari* is 15 years and age at first maturity is 3 years (Radtke 1990, Kock and Everson 1997) and one generation length is 9 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2. By inferring that the generation length for *C. esox* is less than *C. gunnari*, it is suspected one generation length for *C. esox* is between 4 to 6 years.

General Use and Trade Information

This species is not utilized, but is taken as bycatch in small, artisanal coastal fisheries that target *Eleginops maclouinus* over the past decade.

Threats

In Puerto Natales, the variation in temperature and oxygen between summer and winter is already considerable, and considering this species is especially sensitive to such environmental changes, climate change is expected to have a major impact on its survival. The threat from competition and overlap with the invasive Chinook Salmon (*Oncorhynchus tschawytscha*) for food as well as the transfer of disease from consumption of salmon food pellets is not fully understood but is feasible (Hüne *et al.* 2018). Its occurrence as bycatch in artisanal fisheries may also impact its population.

Conservation

There are no species-specific conservation measures. Part of its distribution overlaps with the Cape Horn Biosphere Reserve, and it occurs in the Francisco Coloane Coastal Marine Protected Area (Hüne *et al.* 2018). Research priorities include conducting additional surveys, life history and impacts from heat shock response. Studies on feeding ecology and genetics are underway.

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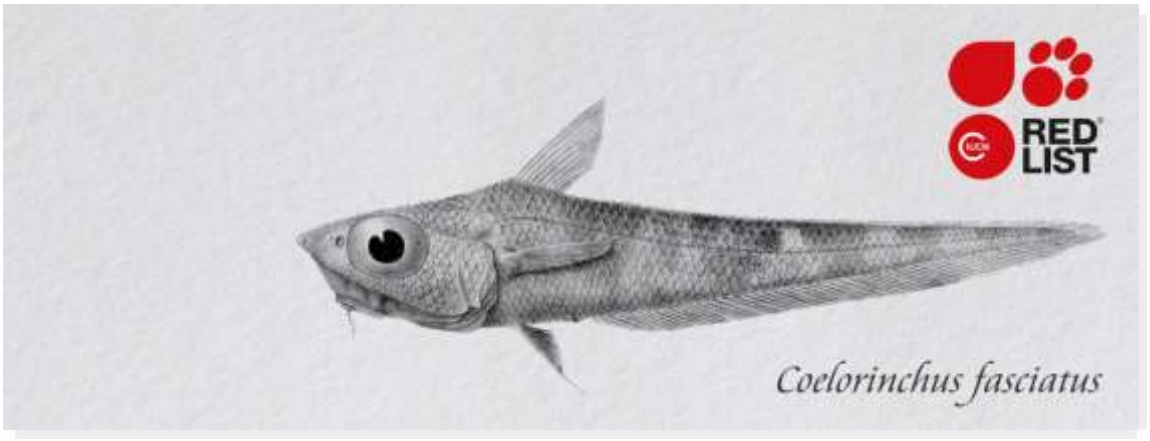

LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This species is widely distributed, common and abundant in the Patagonian Sea. It occurs as bycatch in longline and bottom trawl fisheries that operate in a large portion of the region and is sometimes retained, but also sometimes discarded. Species-specific information is not available because it is easily confused with other grenadier species, but it does not have a particularly high market value. Fishing activity is not expected to be driving population declines approaching a Near Threatened or threatened level at this time; therefore, it is listed as **Least Concern**.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

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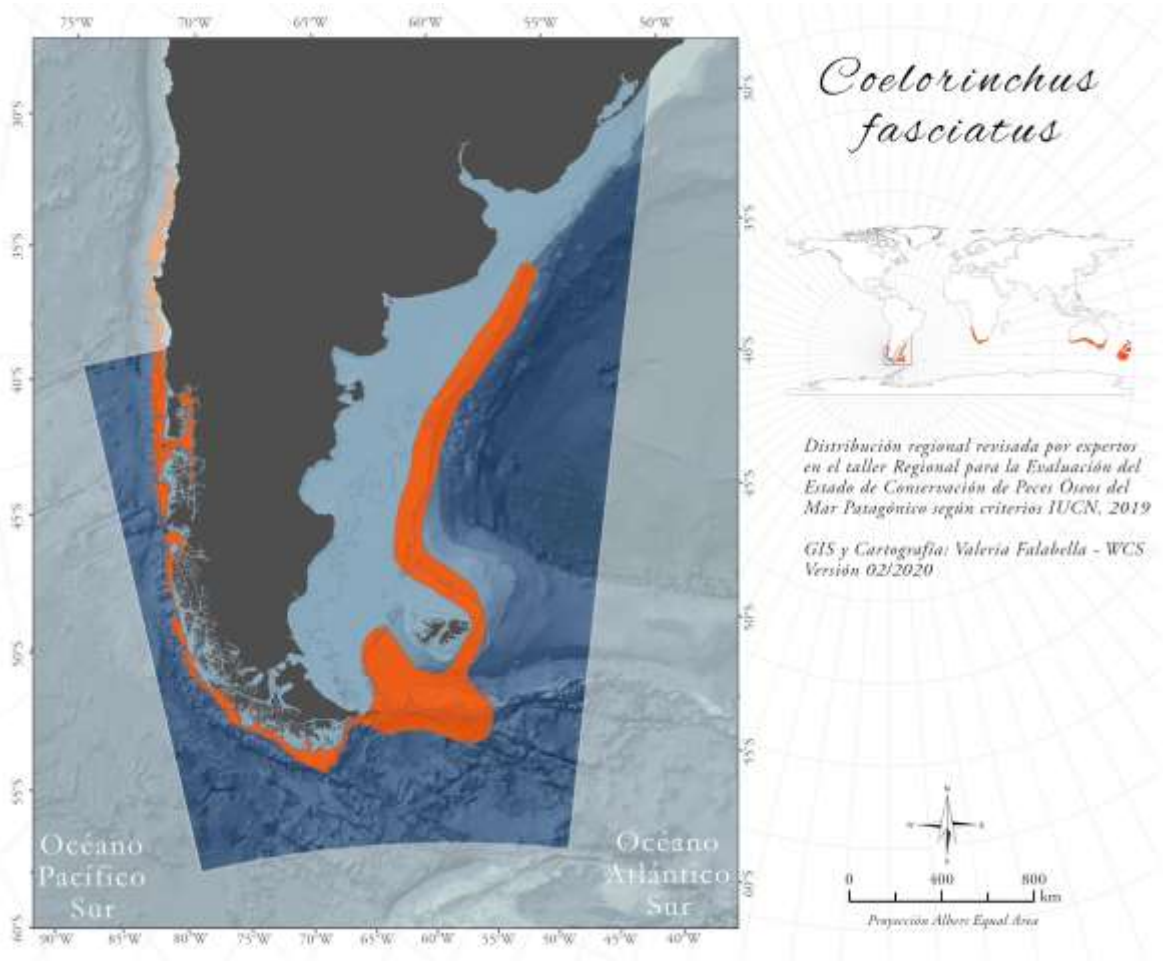
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - GADIFORMES - MACROURIDAE - Coelorinchus – fasciatus (Günther, 1878)

Common Names: Banded Whiptail (English), Granadero Chico (Spanish; Castilian)

Geographic Range



This species is widely distributed in the Patagonian Sea. It occurs in the Pacific off Chile from 33°S south into the western Atlantic to about 37°S off Argentina, including the Malvinas (Cousseau 1993). It also occurs elsewhere in the temperate waters of the Southern Hemisphere off southern Africa, the southern tip of South America, New Zealand and southern Australia (Fishes of Australia 2007). The depth range is 73-1,300 metres (M. Hüne pers. comm. 2019).

Population

This species is relatively common throughout the Patagonian Sea region, especially in the southern portion (J.M. Díaz de Astarloa pers. comm. 2019). It is not well-known what the proportion of the grenadier catch this species comprises.

Habitats and Ecology

This bathydemersal species inhabits the continental shelf and slope. It consumes small fishes, crustaceans, polychaete worms, gastropod and bivalve molluscs and echinoderms (Fishes of Australia 2007).

General Use and Trade Information

This species was taken by Russian trawlers that targeted grenadiers off southern Argentina in the 1990s (J.M. Díaz de Astarloa pers. comm. 2019). Currently, it has some limited commercial value in the region, but species-specific data are not available due to confusion with other grenadier species. It frequently occurs as bycatch in longline fisheries that target toothfish and bottom trawl fisheries that target hake in the Patagonian Sea region (C. Buratti, J.M. Díaz de Astarloa and M. Hüne pers. comm. 2019). Due to its small size, this species is not valued in the Argentine grenadier fishery, and is discarded when caught (C. Buratti pers. comm. 2019). In Chile, this species is discarded in longline fisheries, but is retained in bottom trawl fisheries (M. Hüne pers. comm. 2019).

Threats

Bycatch from fishing activity is not expected to be driving region-level declines approaching Near Threatened or threatened in the Patagonia Sea at this time.

Conservation

There are no species-specific conservation measures.

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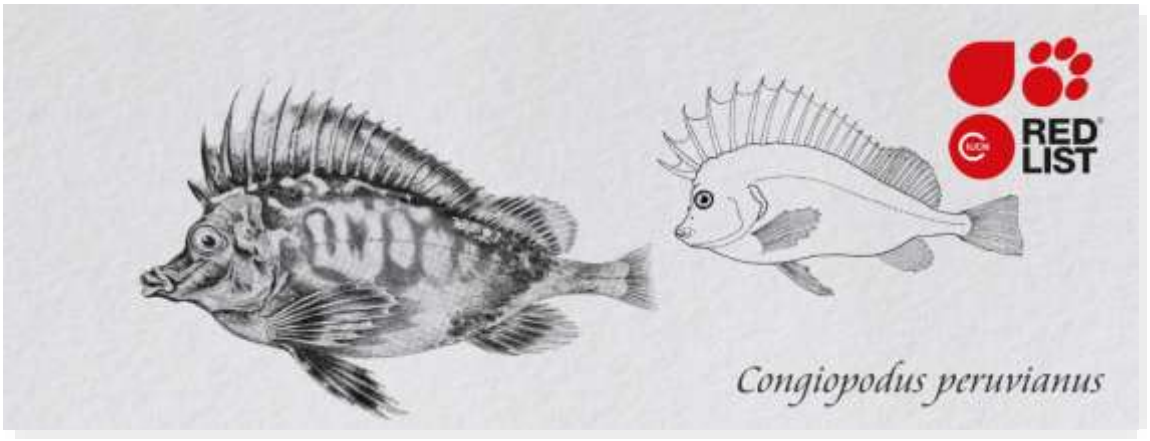


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This widely distributed, demersal species is common through most of its range. There are no known major threats; therefore, it is listed as Least Concern.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

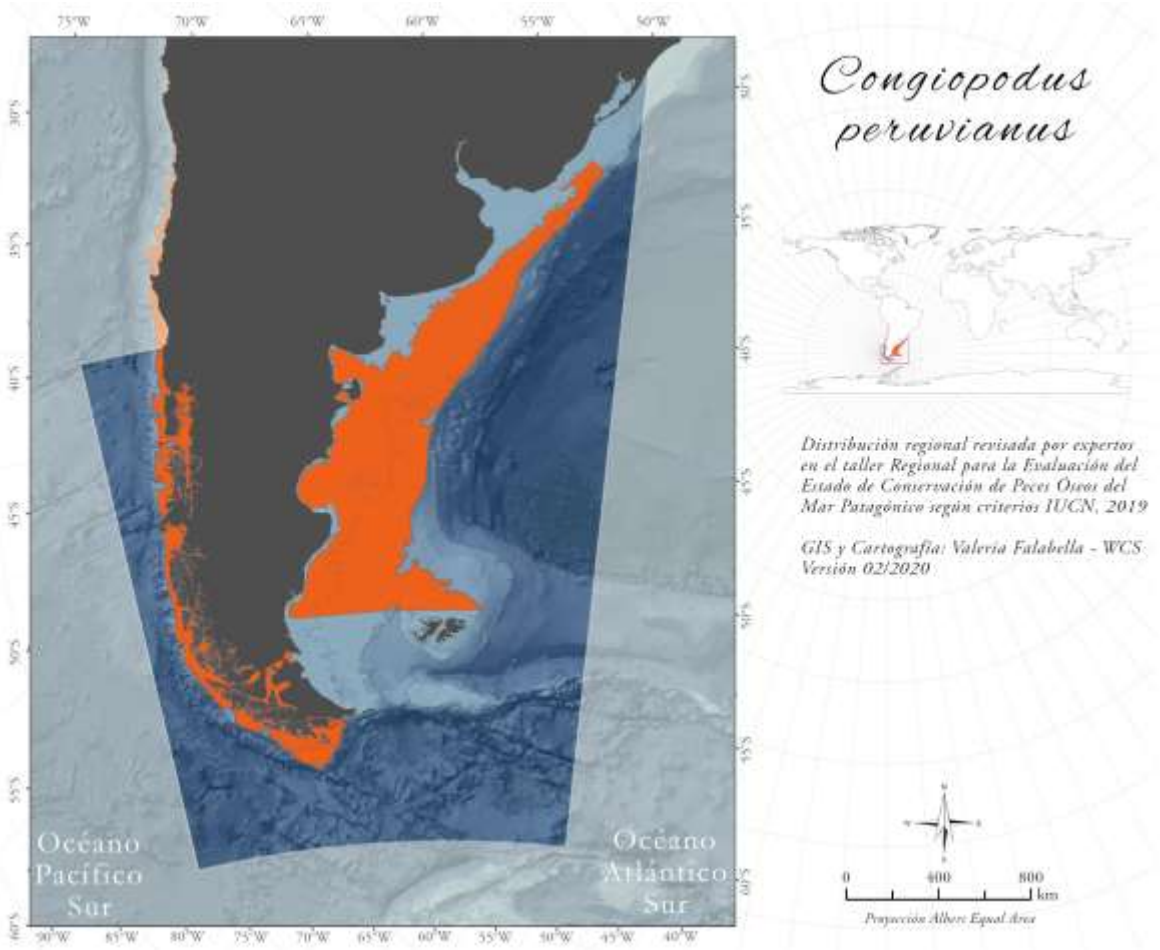
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - SCORPAENIFORMES - CONGIOPODIDAE - Congiopodus – peruvianus (Cuvier, 1829)

Common Names: Horsefish (English)
Synonyms: Agriopus peruvianus Cuvier, 1829

Geographic Range



This species is distributed in the southeastern Pacific from Lima, Peru to the southern tip of Chile and in the southwestern Atlantic off Argentina at 50°S north to Uruguay. The depth range is 0-200 metres.

Population

This species is common through most of the Patagonia Sea region. It is common and frequently observed in Argentina (Scarlato *et al.* 2016, C. Buratti and J.M. Díaz de Astarloa pers. comm. 2019). It is less common off Chile than in Argentina, and its abundance is lower in the northern parts of Chile to Peru as compared to the southern parts of Chile (M. Hüne pers. comm. 2019).

Habitats and Ecology

This demersal species occurs in rocky reef habitats, including kelp beds, and often hides in caves and rocky overhangs (A. Irigoyen pers. comm. 2019). It can also occur in sandy and shelly areas (C. Buratti pers. comm. 2019). Juveniles rest on the bottom and mimic dead leaves. The maximum length is 27 cm (Betti and Daneri 2019). Females and males are remarkably sexually dimorphic in the colour pattern. Females are lighter than males. Females have a light brown/orange background with black stripes and blotches all over the body, including fins. The belly is unpigmented. Males, in contrast, are much darker than females. Most of the body is dark brown except the mid part of body which is light brown. All fins are dark and the belly as well (J.M. Díaz de Astarloa pers. comm. 2020).

General Use and Trade Information

This species is not commercially exploited. It is occasionally collected, dried and sold in some parts of Patagonia as a souvenir (J.M. Díaz de Astarloa pers. comm. 2019). It is sometimes discarded as bycatch in hake fisheries off Argentina, but has a relatively high survival rate (C. Buratti pers. comm. 2019)

Threats

There are no known major threats.

Conservation

There are no species-specific conservation measures. It occurs in a permanent closed are for Argentine hake trawl fisheries on the Argentine continental shelf around 45°S (Alemany *et al.* 2013).

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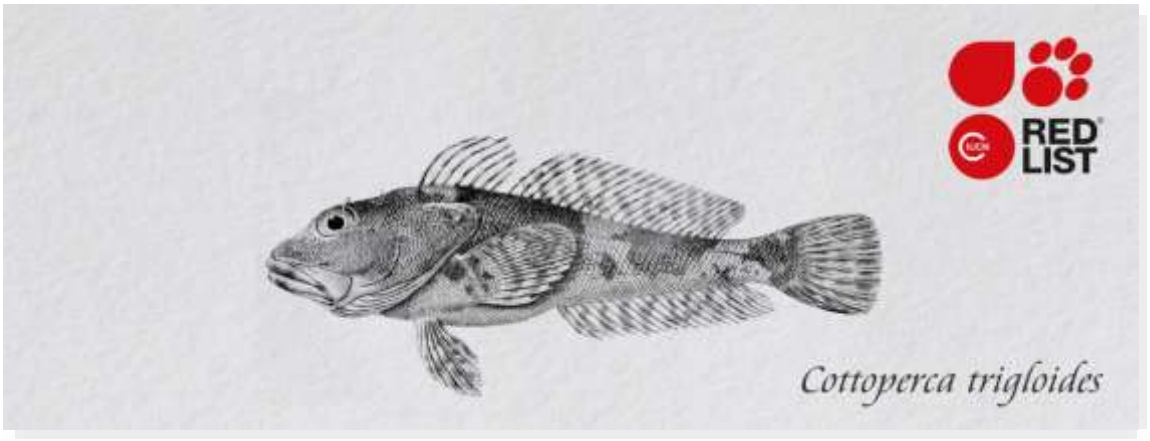


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This widely distributed, demersal species is associated with rocky bottoms and kelp forests. It is discarded as bycatch in trawl fisheries, but this is not expected to be driving population declines approaching a Near Threatened or threatened level at this time; therefore, it is listed as **Least Concern.**

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

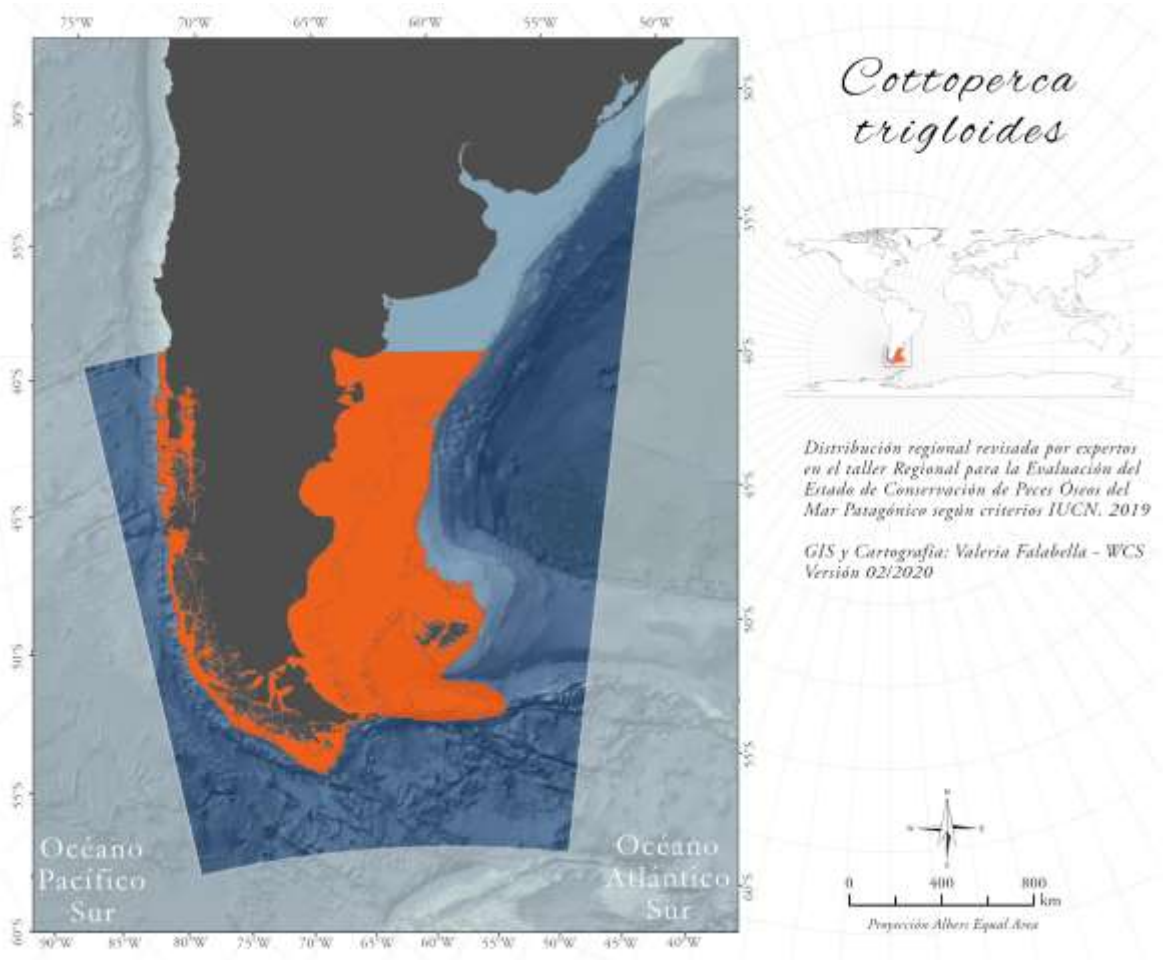
Facilitators/Compilers: Linardich, C., Falabella, V. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - BOVICHTIDAE - Cottoperca – trigloides (Forster, 1801)

Common Names: Frogmouth (English), Channel Bull Blenny (English), Torito de los canales fueguinos (Spanish).
Synonyms: Batrachus trigloides Forster, 1801
Taxonomic Note: *Cottoperca gobio* is considered a synonym of this species.

Geographic Range



This species is endemic to the Patagonia Sea region. It occurs from Puerto Montt in central Chile (41°S) to the Beagle Channel (55°S) to Tierra del Fuego north to 41°S in Argentina, including the Malvinas Islands. Records from Uruguay require verification. The depth range is 5-310 metres, but is more common between 5-25 m (Reyes and Hüne 2012).

Population

This species is not abundant and is relatively uncommon throughout its range. In Chile, it is most common south of the Corcovado Gulf (43°39'S) (Reyes and Hüne 2012). Lattuca et al. (2010) described the possible existence of three population groups.

Habitats and Ecology

This demersal species inhabits rocky bottoms and kelp forests (Reyes and Hüne 2012, Friedlander *et al.* 2020). Egg masses are attached to the substrate (Arkhipkin *et al*. 2015). The maximum total length is 80 cm (Laptikhovsky and Arkhipkin 2003, Eastman 2019). Longevity is at least 8 years, but may live a few more years longer than that (C. Buratti pers. comm. 2019).

General Use and Trade Information

This species is not utilized, but is commonly discarded as bycatch in high-sea trawlers targeting hake (*Merluccius hubbsi*) and Patagonian shrimp (*Pleoticus muelleri*) in San Jorge Gulf, Chubut, Argentina (Bovcon *et al.* 2013, Arkhipkin *et al*. 2015) and trawl fisheries in Chile (Reyes and Hüne 2012).

Threats

Bycatch from fishing activity is not expected to be driving global-level declines approaching Near Threatened or threatened at this time.

Conservation

There are no species-specific conservation measures.

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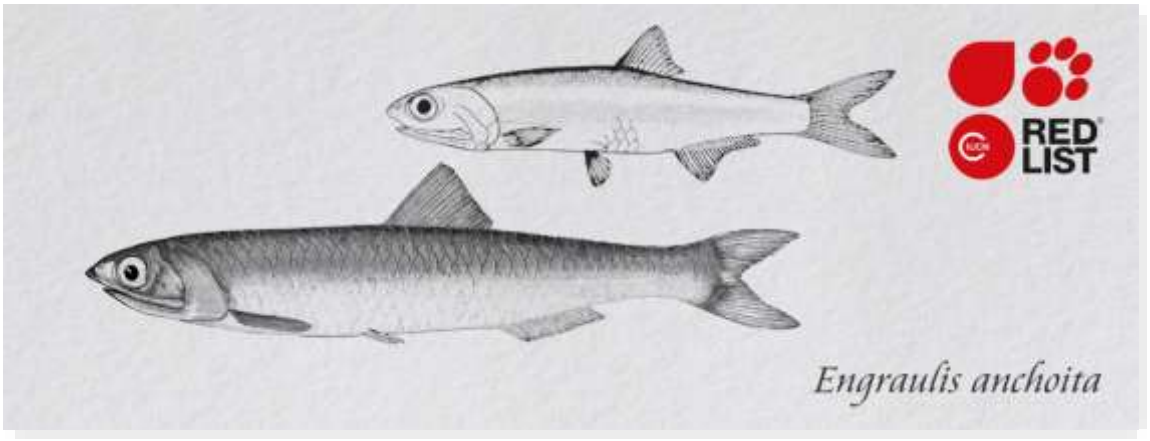


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This coastal to mid-continental shelf, pelagic species is widely distributed from Brazil to Argentina. It is a short-lived species with an estimated generation length of 2-4 years. Biomass fluctuates naturally with environmental conditions. It is currently commercially exploited only in Argentina. The global population is comprised of three stocks (1. southeast Brazil north of 28ºS, 2. Brazil south of 28ºS, Uruguay and Argentina to 41ºS and 3. Argentine Patagonia between 41ºS and 48ºS). Abundance of the species in Brazil is stable. According to fishery independent scientific surveys, the Buenos Aires stock has a high biomass close to historical levels and it is underexploited. The Argentine population is regularly monitored and there are stringent fishing regulations in place. Fishing activity is not expected to be driving global-level declines approaching a Near Threatened or threatened level at this time. It is listed as **Least Concern** with a recommendation to continue to conduct research cruises to improve stock assessments. Research is also needed to better understand the observed changes in body size structure of the southern stocks.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

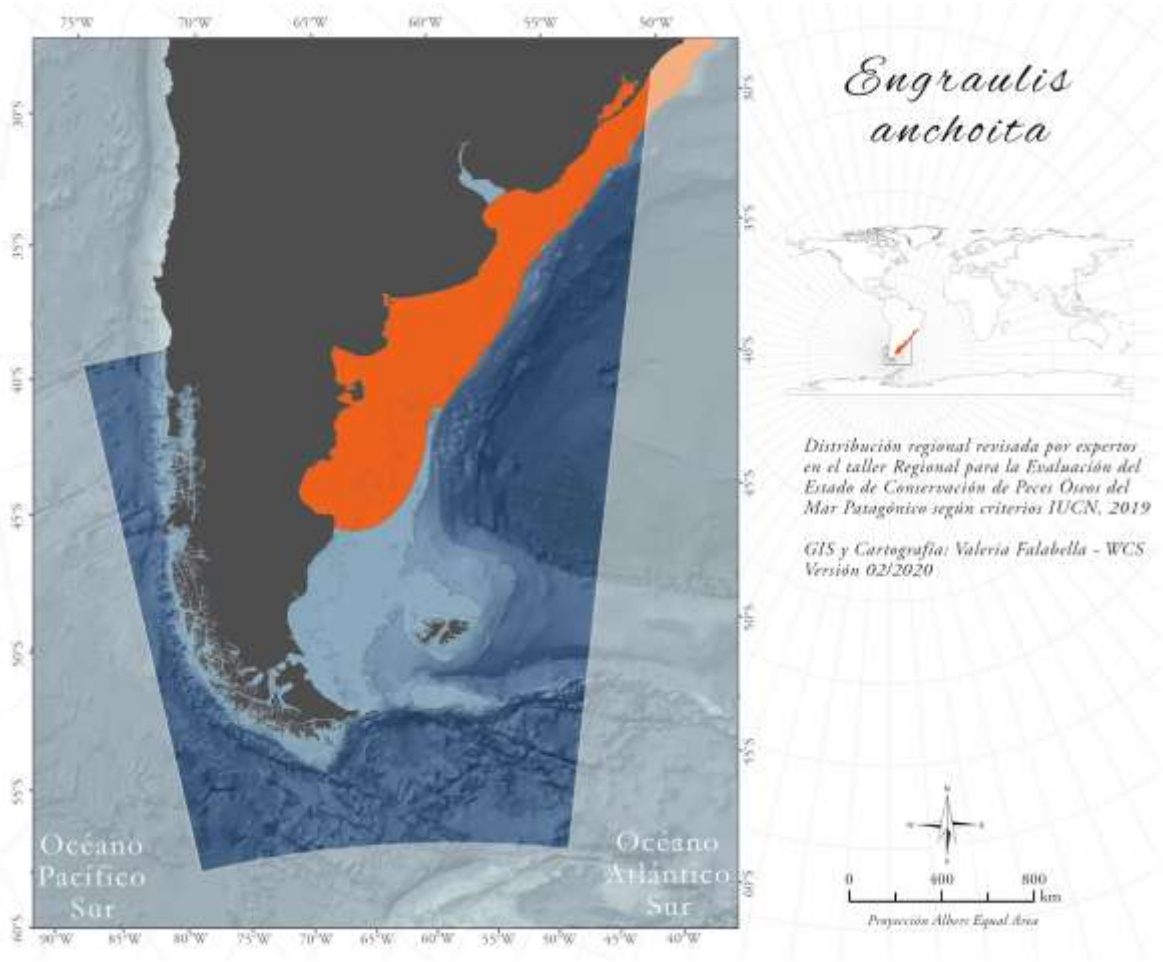
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - CLUPEIFORMES - ENGRAULIDAE - Engraulis – anchoíta (Hubbs & Marini, 1935)

Common Names: Anchoíta (Spanish, Castillian)

Geographic Range



This species is distributed in the southwestern Atlantic from 20°S near Vitória, Brazil to 48°S near southern San Jorge Gulf, Argentina. The depth range is 30-200 metres (Whitehead *et al.* 1988), but mostly occurs shallower than 60 m (Costa *et al.* 2016).

Population

Three distinct stocks comprise the global population of this species: the Brasilera stock from 20 to 28°S (Vitória Cape to Santa Maria Grande Cape), the Bonaerense stock from 28 to 41°S (southern Brazil to Uruguay and northern Argentina) and the Patagonia stock from 41 to 48°S. The Bonaerense stock is the largest of the three (Prenski *et al.* 2011, Carvalho and Castello 2013). Fisheries catch data (Pauly and Zeller 2015, Villasante *et al.* 2015, FAO 2016) are not reflective of actual population trends (C. Buratti pers. comm. 2019). Biomass can fluctuate widely due to natural cycles in environmental conditions that influence the annual recruitment success of this species, especially the geographic position of water mass fronts or areas of convergence (Costa *et al.* 2016, Do Souto *et al.* 2018). Biomass fluctuations are not considered to be caused by fishing pressure at this time.

Brazil: This species is common and abundant in Brazil. Despite its high abundance, it has not been commercially exploited in Brazil, and it is at a virgin biomass level there (Madureira *et al.* 2009, Carvalho and Castello 2013, Costa *et al.* 2016). In Brazil, it is only used as bait, and the quantities captured are exceptionally low (J. Vieira and C. Buratti pers. comm. 2019). Biomass is estimated via acoustic surveys conducted in southern Brazil (Costa *et al.* 2016).

Uruguay and Argentina: Exploitation of this species in Argentine waters began after the first World War. It was also exploited by Uruguay prior to 2007 for a reduction fishery. It is now only exploited by Argentina for human consumption. Fishing effort increased until the 1990s. The coastal fishing fleet responsible for 85-90% of the landings experienced a 15-30% reduction in number of vessels in 1994 and 1995 (Prenski *et al.* 2011). There are two stocks: one located off Buenos Aires Province and the other occurring south of 41ºS. The Buenos Aires stock is the larger of the two and is where the fishery is concentrated. Catch has remained well-below the total allowable catch limit and it is currently considered underexploited (Orlando *et al.* 2019, Ciancio *et al.* 2020). Biomass estimates have been conducted for the Buenos Aires stock since 1990; however, research cruises important to estimating stock biomass were not able to be carried out between 2008 to 2017. Two research cruises have been carried out in Argentina in recent years: in 2018 for the Patagonian stock and in 2019 for the northern stock. This work has allowed for biomass estimates to be improved. For the period from 1990 to 2018, total and spawning stock biomass fluctuated over time and exploitation level was relatively low. Over the past three generation lengths, or since 2008, estimated biomass increased from about 1 million tons to 2.5 million tons. Currently, the Buenos Aires stock has a high biomass near historical levels (Orlando *et al.* 2019). The average size of individuals in the catch has declined, but the cause of this is poorly understood (Garciarena *et al.* 2019).

Habitats and Ecology

This pelagic species forms schools in coastal waters over the continental shelf. The maximum standard length is 17 cm (Whitehead *et al.* 1988). It fills an important ecological role as a prey item for larger marine species. This species spawns year-round and most intensely between October and November. Natural mortality is 0.9-1.01 (Madureira *et al.* 2009, Orlando *et al.* 2019). The average maximum age is approximately 6-7 years, although some individuals have been aged to 8 or 9 years (Prenski *et al.* 2011). Length at first maturity for the Argentine northern stock

is 9.8 cm and 11.9 cm for the Patagonian stock (Hansen 2011). Age at first maturity is 1 year (Hansen 2000). When applying an age at first reproduction of 1 year and longevity of 7 years, its estimated generation length is 4 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2. When applying an alternative equation recommended by the IUCN Red List methods: 1/adult mortality + age of first reproduction, the generation length is about 2 years.

General Use and Trade Information

Prior to 2007, this species was commercially exploited by Uruguay and Argentina, but currently, Argentina is the only country actively targeting this species for commercial purposes (Costa *et al.* 2016). It is primarily caught using semi-pelagic mid-water trawl nets and purse-seines (Prenski *et al.* 2011). In Argentina, this species is only utilized for human consumption, not for reduction fisheries. Much of the catch is exported for the international market, especially Spain (C. Buratti pers. comm. 2019).

Threats

Fishing activity is not expected to be driving global-level declines approaching a Near Threatened or threatened level at this time.

Conservation

Stock assessments are conducted regularly by the National Institute for Fisheries Research and Development (INIDEP). Fishing regulations in Argentina include total allowable catch limits, body size minimum, fishing permit requirements, gear restrictions and a closed fishing area in the Argentine-Uruguayan Common Fishing Zone. The Buenos Aires fishery was first certified as sustainable and well-managed by the Marine Stewardship Council (MSC) in 2011 and re-certified in 2016 until 2021 (Prenski *et al.* 2011, Orlando *et al.* 2019). Research is needed to better understand the observed changes in body size structure of the southern stocks (Garciarena *et al.* 2019).

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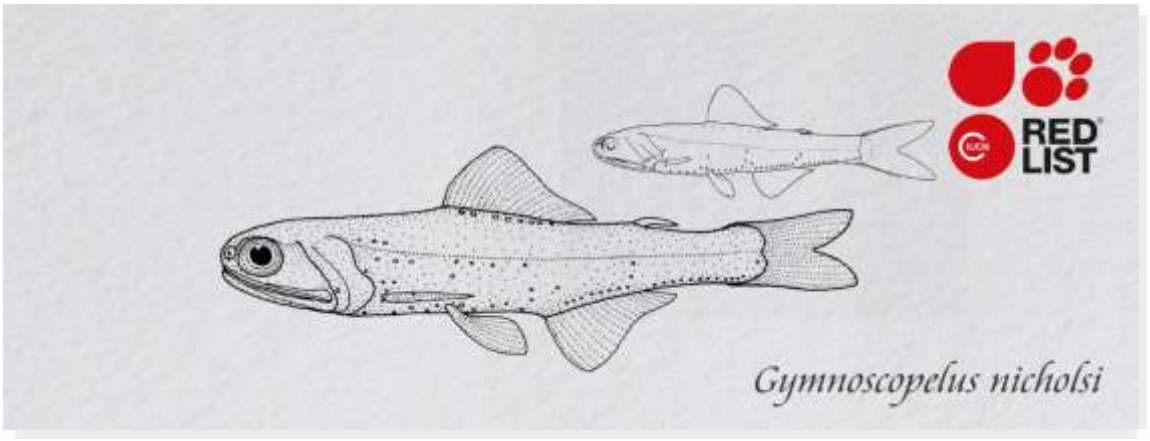


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This mesopelagic species is widely distributed in the Patagonia Sea region and can be common and moderately abundant. Elsewhere, it is widespread in the Atlantic, Pacific and Indian oceans. It occurs as bycatch in commercial krill fisheries directly south of the region in the Antarctic Circle. This fishery is regulated by the Convention for the Conservation of Antarctic Marine Living Resources and population declines are not suspected at this time. There are no known major threats; therefore, it is listed as **Least Concern** in the Patagonia Sea.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

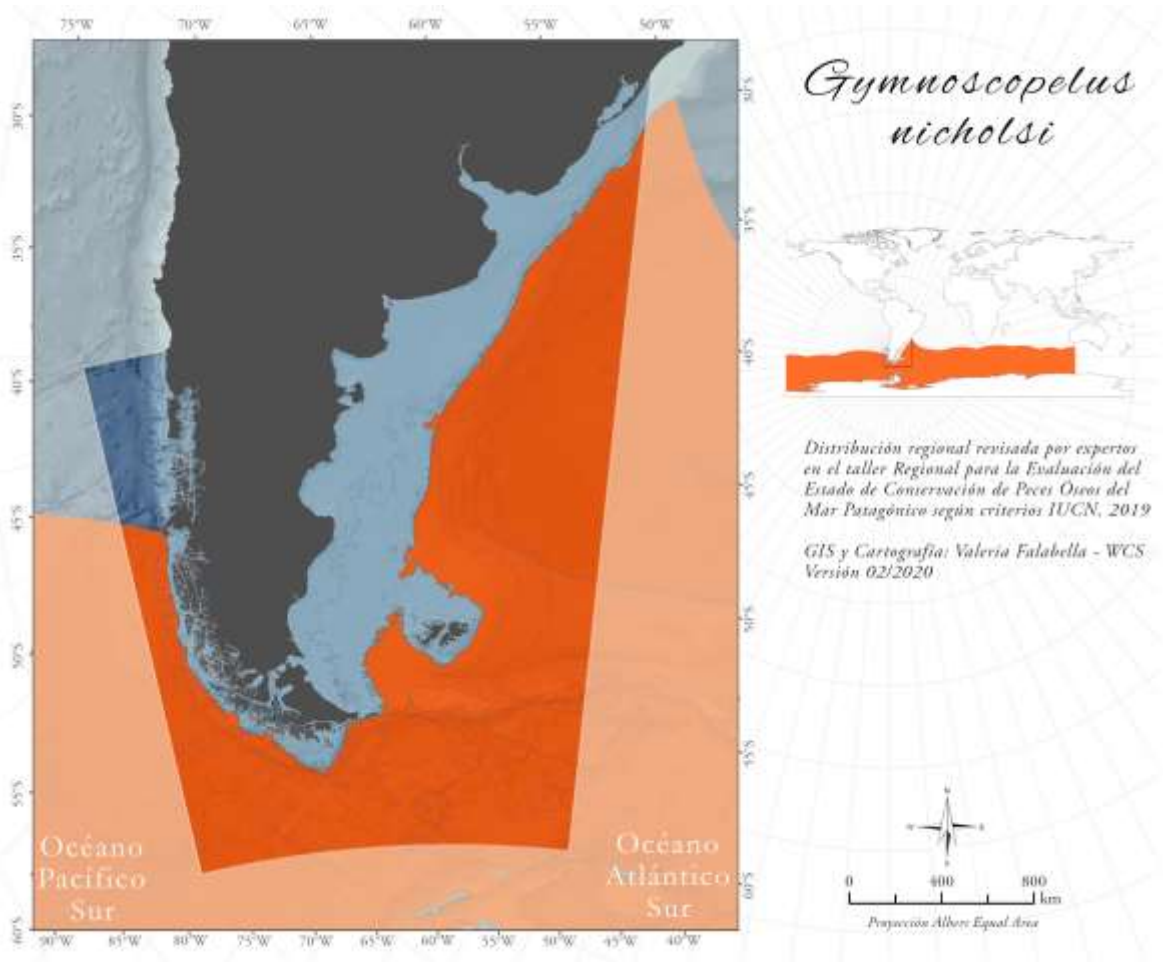
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - MYCTOPHIFORMES - MYCTOPHIDAE - Gymnoscopelus – nicholsi (Gilbert, 1911)

Common Names: Nichol's Lanternfish (English)
Taxonomic Note: *Gymnoscopelus aphya* and *G. nicholsi* are considered to be the same species, with the valid name being *G. nicholsi* (J. Paxton pers. comm. 2018).

Geographic Range



In the Patagonia Sea region, this species occurs off Chile to 47°S, southward to the Antarctic Circle and northward to southern Brazil. Elsewhere, it is circumglobally distributed in the Southern Ocean and Antarctic (Hulley 1990). Its depth range is 50-250 metres.

Population

This species is relatively abundant in the Patagonia Sea region, as well as in areas neighboring it, including where it is abundant in the Scotia Sea (Linkowski 1985, Saunders *et al*. 2015). It is the most abundant species of the mesopelagic fish fauna in the southwest Atlantic (Figueroa *et al*. 1998).

Habitats and Ecology

This mesopelagic species has a maximum standard length of 16.1 cm (Hulley 1990). It is an important prey item for top predators in the Patagonia region (Klemmedson *et al.* 2020).

General Use and Trade Information

Fishing activity is not expected to be driving declines approaching a Near Threatened or threatened level at this time.

Threats

Fishing activity is not expected to be driving declines approaching a Near Threatened or threatened level at this time.

Conservation

The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) manages the krill fishery and sets regulations that include catch limits.

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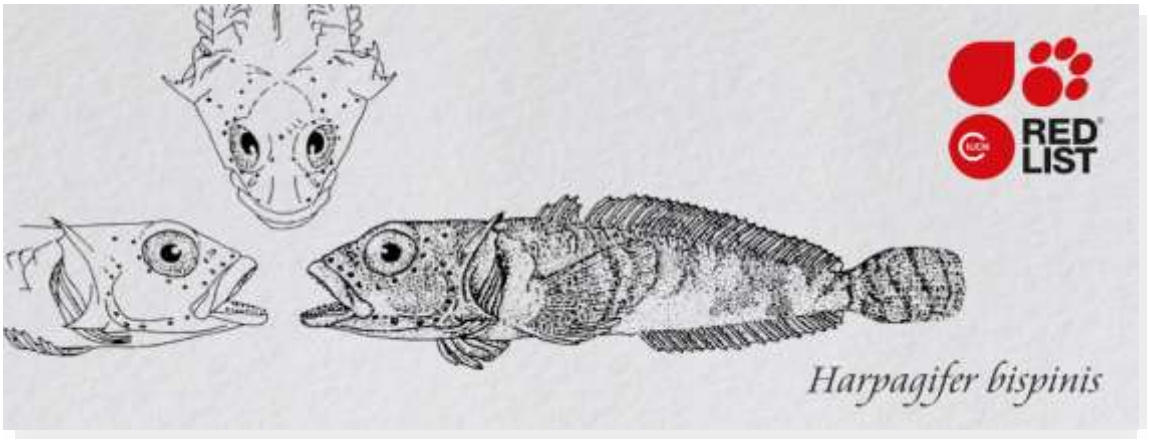
Saunders, R.A., Collins, M.A., Ward, P., Stowasser, G., Shreeve, R. and Tarling, G.A. 2015. Trophodynamics of Protomyctophum (Myctophidae) in the Scotia Sea (Southern Ocean). *Journal of Fish Biology* 87(4): 1031-1058.



LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This rocky, intertidal species has a relatively small range, but is common and abundant. There are no known major threats at this time; therefore, it is listed as **Least Concern**.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

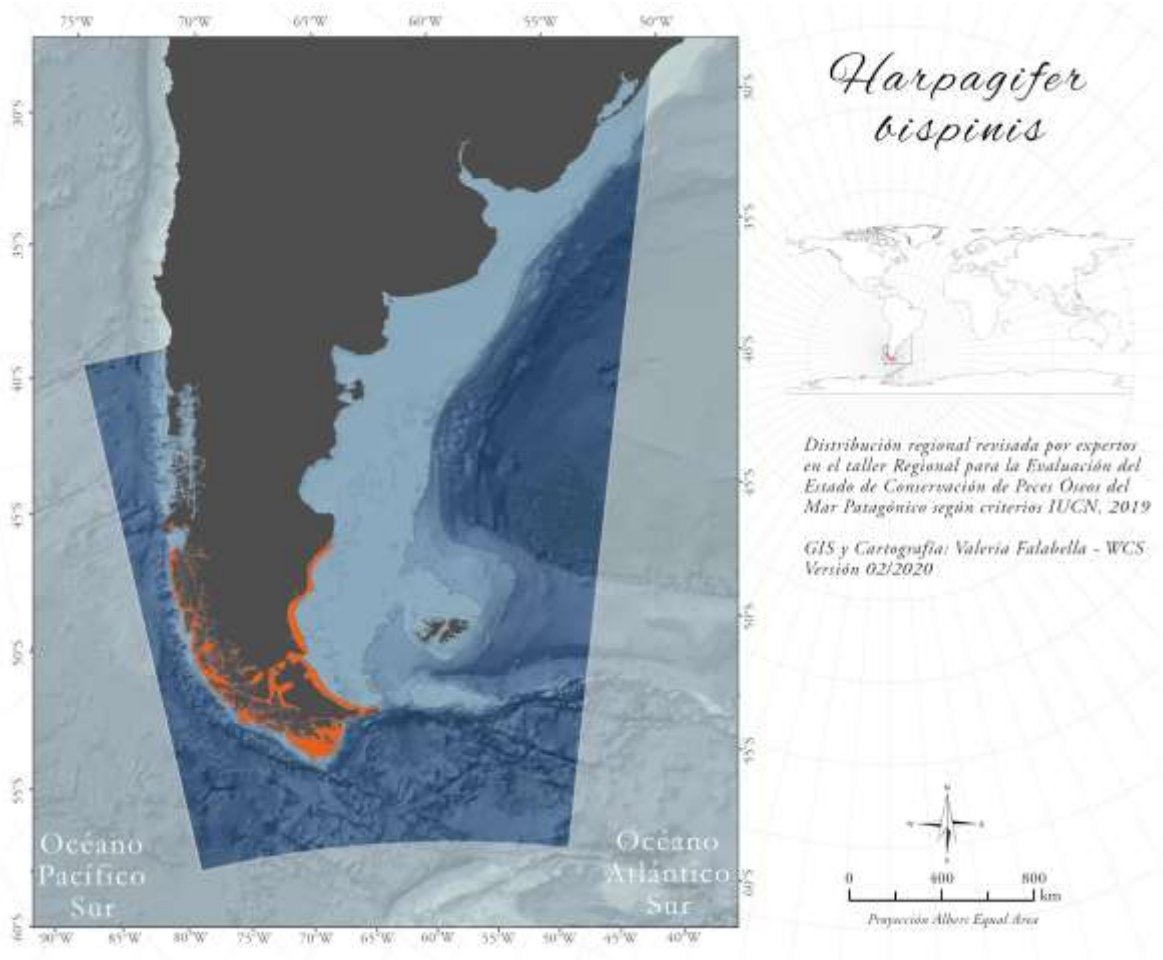
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - HARPAGIFERIDAE - Harpagifer – bispinis (Forster, 1801)

Common Names: Magellan Plunderfish (English)
Synonyms: Batrachus bispinis Forster, 1801
Taxonomic Note: Work is underway that will consider *Harpagifer palliolatus* a synonym of *H. bispinis* (M. Hüne pers. comm. 2019).

Geographic Range



This species is endemic to the Patagonia Sea region. It occurs in the southeastern Pacific off Chile from the Gulf of Penas at 50°S to the Magellan Strait and Cape Horn into the southwestern Atlantic to the Deseado River in Argentina. The depth range is 0-50 metres. As *Harpagifer palliolatus* is expected to be synonymized under *H. bispinis*, the Malvinas Islands would then be added to this distribution. Records from the Antarctic Peninsula should be attributed to *Harpagifer antarcticus* (Hüne *et al*. 2015).

Population

This species is abundant in the intertidal areas of fjords and channels in Patagonia (Hüne and Vega 2016). Despite it being one of the most abundant species, its larvae are not abundant and accounts for less than 0.03% of larval abundance (M. Hüne and M. Landaeta pers. comm. 2019).

Habitats and Ecology

This demersal species occurs in the intertidal zone on rocky substrate. This habitat is increasing due to the melt of glaciers in the intertidal zone (M. Hüne pers. comm. 2019). The maximum total length is 10 cm, but most individuals are less than 7 cm. It has an ecological role as an important prey item for sea birds and penguins (Hüne and Vega 2016).

General Use and Trade Information

This species is not utilized and does not occur as bycatch in fisheries.

Threats

This species may be consumed by the invasive Chinook Salmon (*Oncorhynchus tschawytscha*), but this is not expected to be driving global-level population declines approaching a Near Threatened or threatened level at this time.

Conservation

There are no species-specific conservation measures.

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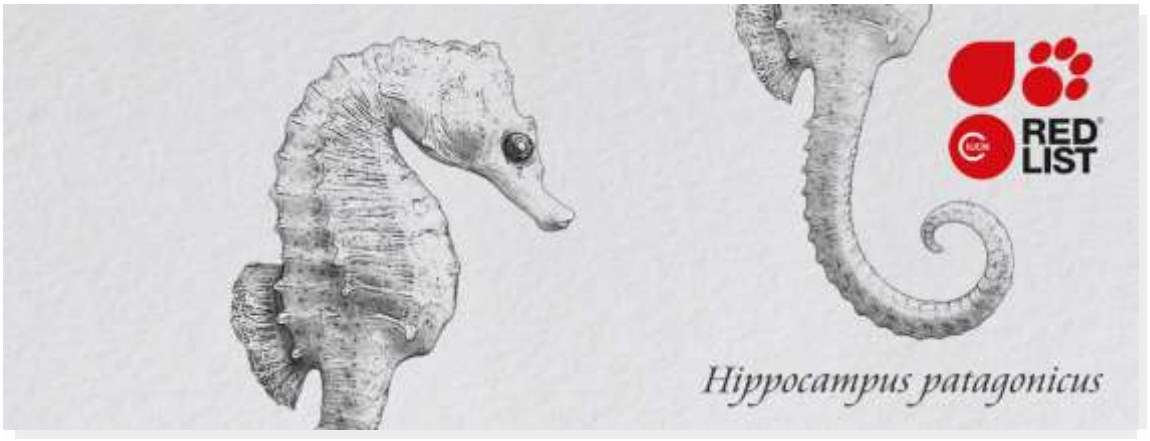
Hüne, M., González-Wevar, C., Poulin, E., Mansilla, A., Fernández, D.A. and Barrera-Oro, E. 2015. Low level of genetic divergence between *Harpagifer* fish species (Perciformes: Notothenioidei) suggests a Quaternary colonization of Patagonia from the Antarctic Peninsula. *Polar Biology* 38(5): 607-617.



CR – Critically Endangered, (IUCN version 3.1)

Assessment Rationale:

This seahorse species occurs in coastal habitats including seagrasses, macroalgae, and sheltered areas with sessile invertebrates. It is patchily distributed in part due to its low dispersal capabilities as well as the low availability of preferred habitat within this region; therefore, connectivity between subpopulations and with populations outside the region in Brazil is considered to be very minimal. In the Patagonia Sea region, it occurs in only two locations in Argentina with major threats identified as exploitation and habitat loss. The only two permanent, established populations remaining are located in Las Grutas in the San Matias Gulf and in Mar del Plata. The extent of occurrence (EOO) in the Patagonia region is larger than 20,000 km^2 and the area of occupancy is less than 500 km^2, but greater than 10 km^2.

Historically, the species was more common in the region, but has declined significantly over time. Exploitation for the seahorse trade (as souvenirs) is the primary major threat driving these declines. According to fisher interviews, the Las Grutas population declined by 90% over the past 30 years. According to scientific surveys, abundance declined by 90% between 2010 and 2019. Declines in the Mar del Plata population are not yet directly quantified, but are suspected to have occurred due to the presence of similar threats impacting the Las Grutas population. Conservation measures in regards to reducing fishing are not sufficiently enforced, and therefore, declines are expected to continue. It is estimated this species has undergone at least a 90% decline or more over the past three generation lengths, or a time period of 10 years, and is listed as **Critically Endangered A2bcd** in the Patagonia Sea region. It also qualifies for Endangered B2ab(iii,v) and Vulnerable D2.

Assessor(s): Díaz de Astarloa, J., Irigoyen, A., Buratti, C., Hüne, M., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

Facilitators/Compilers: Linardich, C., Falabella, V. & Wildlife Conservation Society

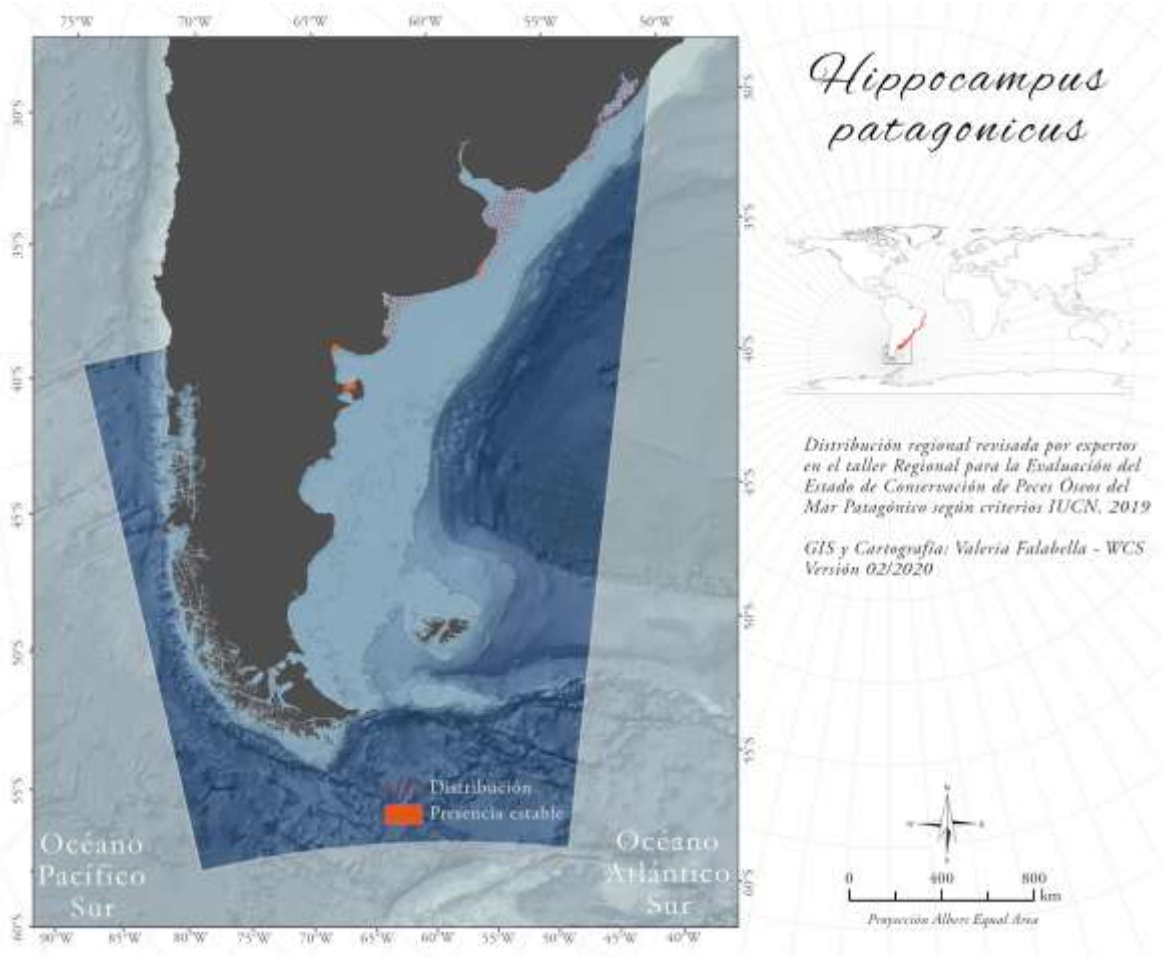
Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - SYNGNATHIFORMES - SYNGNATHIDAE - Hippocampus – patagonicus (Piacentino & Luzzatto, 2004)

Common Names: Patagonian Seahorse (English), Caballito de Mar Patagónico (Spanish; Castilian), Patagonian Sea-horse (English)

Taxonomic Note: This species was likely misidentified as Hippocampus erectus prior to its description in 2004.

Geographic Range



In the Patagonia Sea region, this species occurs in two locations in Argentina: Las Grutas in the San Antonio Bay and Mar del Plata (Piacentino and Luzzatto 2004, Boehm *et al.* 2013). Records from the San José Gulf or Puerto Madryn do not represent viable, permanent populations. Outside

the region, it occurs in Brazil to Recife in Pernambuco State (Luzzatto *et al*. 2012, Boehm *et al.* 2013, Silveira *et al.* 2014, Pereira *et al.* 2016, R. Silveira pers. comm. 2016). The depth range is 0-120 metres (Rosa *et al.* 2011; Luzzatto *et al.* 2012, 2014), but primarily occurs from 0-14 m. The extent of occurrence (EOO) in the Patagonia region is larger than 20,000 km^2. The area of occupancy (AOO) of Las Grutas and Mar del Plata is less than 10 km^2, but the inclusion of some individuals existing in areas elsewhere would increase the AOO to larger than 10 km^2, but less than 500 km^2.

Population

To date, there has been no dedicated range-wide surveys or population estimates for this species in the Patagonia Sea region, but it is known to have a patchy distribution. Connectivity with populations outside the region (in Brazil) is considered to be low, but declines have been documented in Brazil. In addition, connectivity between subpopulations in the region is also low due to the species' low dispersal capabilities and the patchy availability of appropriate habitat within this region. In the Patagonia Sea region, there are only two localities with permanent populations: Las Grutas in the San Matias Gulf and Mar del Plata. It is only occasionally found elsewhere in the region primarily due to the generally low availability of its preferred habitat in the region. The Mar del Plata population is very small compared to the Las Grutas population, and became established there only relatively recently (over the past 6 years) as hard-structure became available due port construction in the area (A. Irigoyen pers. comm. 2019). Historically, the species was commonly found in San Antonio Bay and its adjacent waters (Perier 1994). It became increasingly restricted to a few areas of the bay over time (Giacardi and Reyes 2012), and is now only existing in Las Grutas, which is located in the far northern corner of the San Matias Gulf (A. Irigoyen and J.M. Díaz de Astarloa pers. comm. 2019). Based on a reconstruction of historical data through fisher interviews and ongoing habitat degradation and loss, the population in San Antonio Bay (Las Grutas) is inferred to have declined by 90% over the past 30 years. Some fishers reported declines of >99% and even local extirpation (Rosa *et al.* 2011, Luzzatto unpublished data). Scientific surveys of the Las Grutas population recorded 5 individuals per 100 m^2 in 2010, but only 1.5 per 100 m^2 in 2018 and 0.5 per 100 m^2 in 2019 (J.M. Díaz de Astarloa pers. comm. 2019). The causes of this decline may correspond not only to active fishing of adult specimens, but also a direct impact on recruitment and an indirect effect due to habitat degradation (Giacardi and Reyes 2012). Less is known on trends in the Mar del Plata population, but it is also experiencing similar threats to the Las Grutas population.

Habitats and Ecology

This species generally occurs in shallow waters up to 15 m depth in Argentina (Piacentino and Luzzatto 2004). In Brazil, it can be found in deeper waters to 120 m (Rosa ***et al.*** 2011). It attaches to marine algae, mainly on floating *Sargassum* species, and on seagrasses, artificial substrates, and sessile invertebrates such as sponges, ascidians, and polychaete worms (Kuiter 2009, Silveira *et al*. 2014, Luzzatto unpublished data). It is an opportunistic predator, mainly feeding on amphipods and decapods (Storero and Gonzalez 2008, Pujol 2014). Juveniles in San Antonio Bay have been reported demonstrating dispersive potential by rafting (Luzzatto *et al.* 2013), and this may explain records of this species in deeper waters, suggesting long-distance migration beyond original populations and explaining the wide distribution range of the species (Luzzatto *et al.* 2014). It is ovoviviparous, and males brood the young in a pouch prior to giving live birth (Foster and Vincent 2004). During spring and summer, individuals are more active and can be found pregnant or displaying mating behaviour (Perier 1994, Pujol 2014). Both males and females appear to reach maturity during the first breeding season after they are born, and captive specimens are mature at 6 months (D. C. Luzzatto unpublished data). Size at maturity is around

11 cm (Pujol 2014), and the species has a longevity of 5 years (J.M. Díaz de Astarloa pers. comm. 2019). When applying an age at first reproduction of 1 years and longevity of 5 years, its estimated generation length is 3 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

Populations in Argentina have been exploited by divers, gatherers, and fisherfolk, resulting in dried specimens sold as souvenirs or as handicrafts, and to a lesser extent as live specimens for aquarium displays (Pujol 2014). In San Antonio Bay, the species has sustained a small-scale fishery that developed over the past 30 years where seahorses are caught by subsistence fishers and local divers along with other marine taxa (Gonzalez *et al*. 2014). In Mar del Plata, it is targeted and caught as by-catch in artisanal fisheries (Pujol 2014). In all cases, seahorses become an extra income for fishers. Shrimp trawling is not present in nearshore areas of the Patagonia Sea region.

Brazil is South America's main consumer of dry seahorses and is the largest source of seahorses from natural populations of this species. It is sold as dried specimens for religious talismans and charms, curios, traditional medicine, and to a lesser extent, as live specimens for aquarium displays in Brazil. The dried trade is unregulated and captures are not reported, but catch data from industrial shrimp trawler landings from 2002–2003 suggested that 1.2 million seahorses potentially entered the dried trade per annum. Exports have occurred to Hong Kong, the USA and Asia (IBAMA 2011, Rosa *et al.* 2011, Vincent *et al.* 2011). It is not known how many of these specimens were of this species, or how this trade affected wild populations.

Threats

Argentina: Seahorses in San Antonio Bay and in Mar del Plata were reportedly exploited to be sold as curios and for aquarium purposes (Luzzatto 2006, Pujol 2014). Rapid industrial and urban development in coastal areas has resulted in habitat degradation and retraction in San Antonio Bay (Luzzatto *et al.* 2012). In Mar del Plata, the main threats identified were fishing to be sold as curios and for aquarium purposes, incidental fishing, contamination, habitat degradation and biological invasions (Pujol 2014). Additionally, tourists and fishermen using seines accumulate large amounts of debris, often incidentally catching rafting juveniles, which would directly influence the species' recruitment (Luzzatto *et al.* 2012).

Brazil: This species is under considerable fishing pressure, and is the most commonly caught seahorse species in the south and southeast regions of Brazil, predominantly as by-catch of industrial shrimp fisheries (Rosa *et al.* 2011, Vincent *et al.* 2011). It is considered especially impacted by overexploitation in the states of Espirito Santo, Rio de Janeiro and Sao Paulo (IBAMA 2011). In addition, habitat degradation by the shrimp fisheries of the *Sargassum* banks where seahorses are found, coastal urban development, and vessel traffic in sensitive areas all pose threats to the species (IBAMA 2011).

Conservation

The entire genus *Hippocampus* is listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), with implementation in May 2004. On a global level, this species was assessed as Vulnerable on the IUCN Red List in 2016.

Argentina: In Mar del Plata, this species has been declared a "Natural Monument", which represents the maximum status of conservation in Argentina. This category prohibits any act that directly or indirectly involves abuse, harm, capture or captivity of the species, except in the case of individuals collected for scientific purposes. In Mar del Plata, this is a flagship species used by "La ciencia hace escuela" www.maresyoceanos.com to educate the community about the importance of coastal ecosystems integrated with the cultural heritage of the region (Vallarino *et al.* 2011). The San Antonio Bay population is located within a protected area, however, legislation is not always enforced. Studies on the species have been increasing in recent years. Long-term monitoring, official records of the number of individuals caught in by-catch, and further research on the biology, ecology, habitat, abundance and distribution of this species is required to prioritize management actions for effective conservation.

Brazil: This species is included in Appendix II of the Instruction No. 5 of the Ministry of the Environment (05/28/2004), which required the implementation of a management plan for the species (IBAMA 2011). In February 2004, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) implemented a quota of 250 specimens per species for the export of seahorses, but this is not monitored or enforced, and has been clearly violated by exporters (Rosa *et al.* 2011). There are no regulations or records for the domestic trade and use of seahorses in Brazil. In southern Brazil, the species seems to be associated with *Sargassum sp.* (IBAMA 2011), and therefore, it is recommended that areas with *Sargassum sp.* should be protected.

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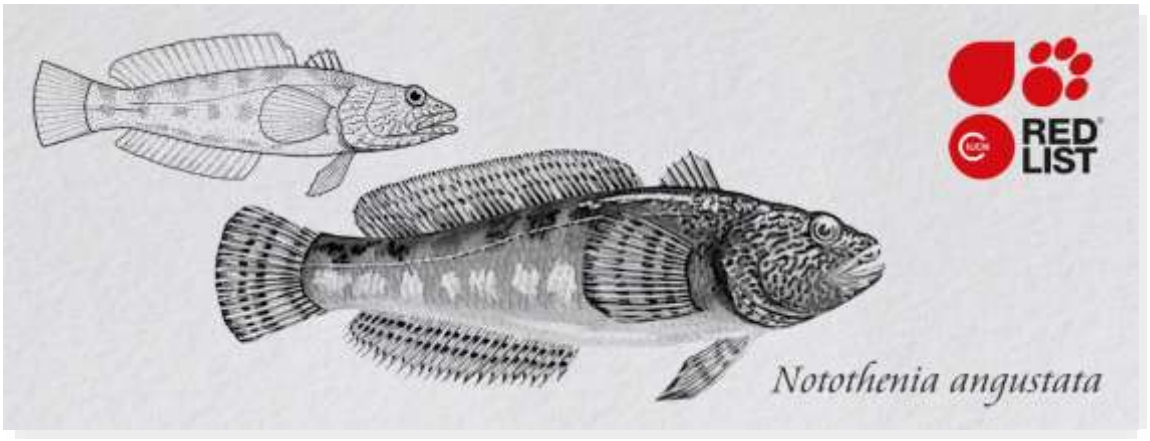


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This rocky reef species is widely distributed, but relatively poorly known in the Patagonia Sea region. It is targeted by spearfishers in a small part of its range (San Jorge Gulf, Argentina) and anecdotal reports indicate it may be sensitive to localized declines. Fishing activity is not expected to be driving regional-level declines at this time. There are no known major threats; therefore, it is listed as **Least Concern** in the Patagonia Sea region. Further sampling is needed to understand its population.

Assessor(s): Hüne, M., Irigoyen, A., Buratti, C., Díaz de Astarloa, J., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

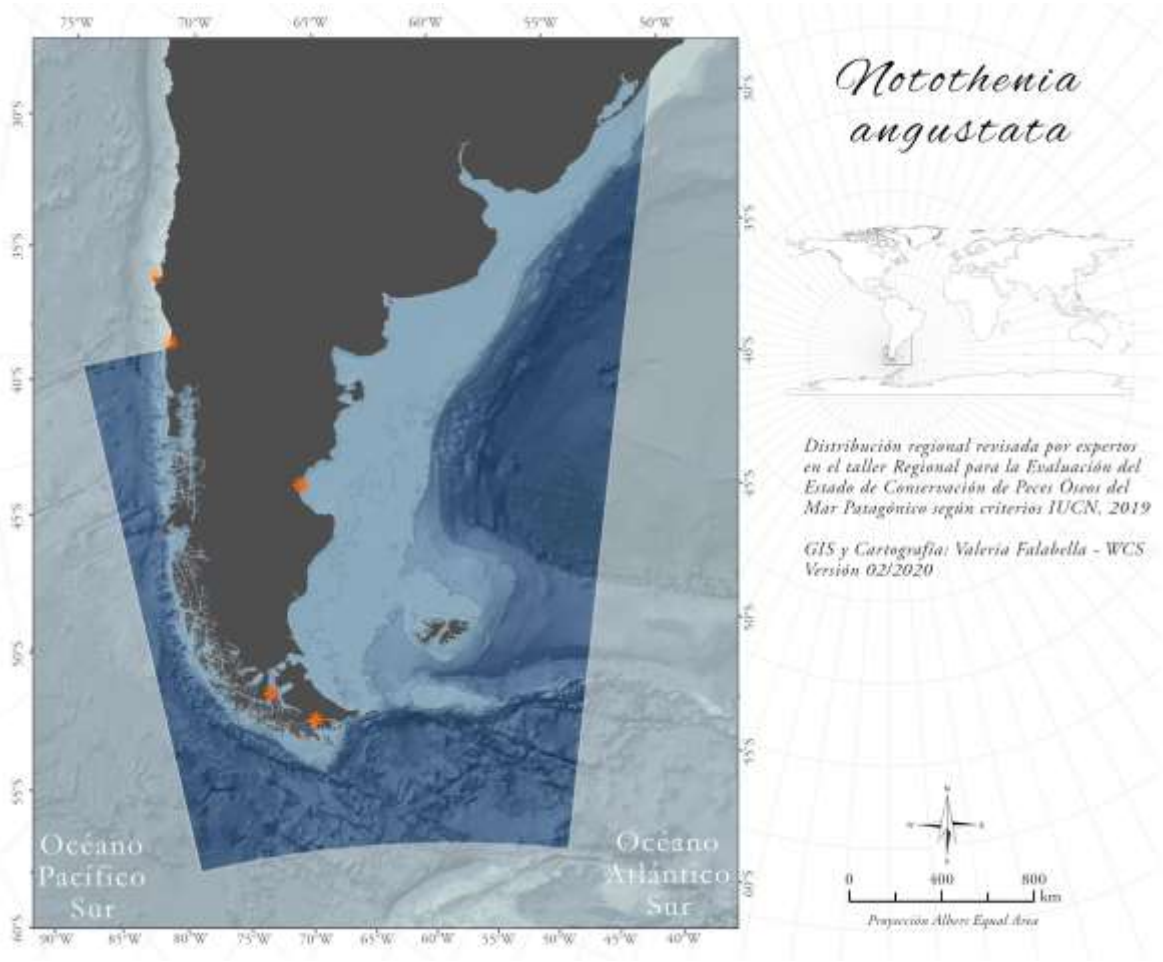
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - NOTOTHENIIDAE - Notothenia – angustata (Hutton, 1875)

Common Names: Maori Chief (English)

Geographic Range



In the Patagonia Sea region, this species is distributed from the central San Jorge Gulf, Argentina south to the Strait of Magellan and north to 38 degrees off Chile. Elsewhere, it also occurs in New Zealand. The depth range is 0-100 metres.

Population

This species is abundant in the southern portion of the San Jorge Gulf, Argentina. Spearfishers in Argentina report that this species is easily overfished and recovery is very slow (A. Irigoyen pers. comm. 2019). Population data are limited for this species in Chile in part due to only scattered sampling effort. Thirty-eight specimens were recorded in northern Chile by Muñoz *et al.* (2001). Only juveniles have been observed in central Chile. Eight specimens were recorded in the Beagle Channel near Ushuaia (López *et al.* 1996).

Habitats and Ecology

This demersal species inhabits coastal rocky reefs from the intertidal zone to 100 metres depth. The maximum length is 70 cm.

General Use and Trade Information

This species is targeted during spearfishing tournaments in the San Jorge Gulf area (A. Irigoyen pers. comm. 2019).

Threats

This species is taken as bycatch in red shrimp (*Pleoticus muelleri*) trawl fisheries (Góngora *et al*. 2009). Fishing activity may cause localized declines where it is targeted by spearfishers in San Jorge Gulf. This is not expected to be driving declines approaching a Near Threatened or threatened level at this time.

Conservation

There are no species-specific conservation measures.

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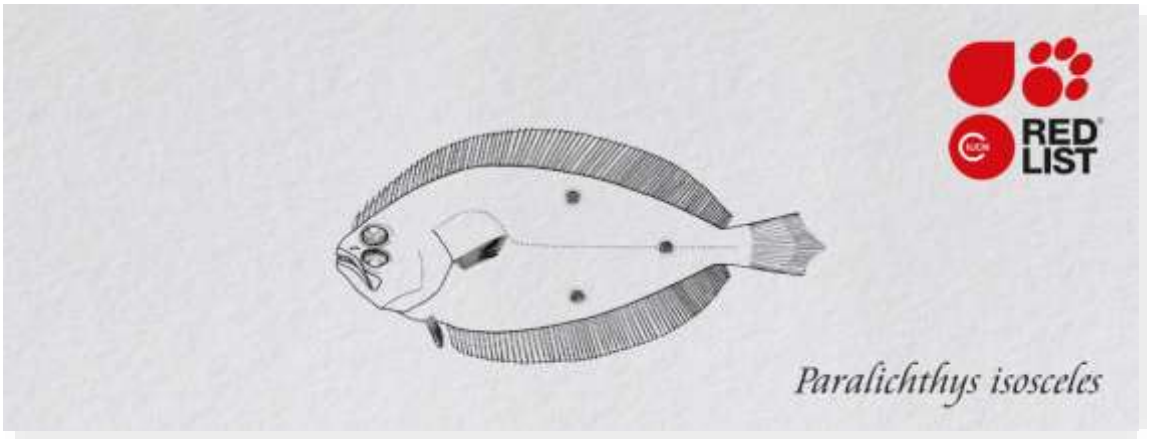


DD – Data Deficient, (IUCN version 3.1)

Assessment Rationale:

This demersal species occurs from southern Brazil to Argentina and is taken in multi-species commercial fisheries that target demersal fishes through much of its range. It is a relatively minor component of the catch of *Paralichthys* species as compared to catch of the sympatric *P. patagonicus*. For purposes of this assessment, half of the global population is considered to occur in Brazil and the other half in Uruguay and Argentina. According to landings and catch per unit effort data, the demersal fish stocks of Brazil are inferred to have declined by at least 30% and possibly to 50%. Due to the lack of specific data for this species, an estimate for population decline is not available or cannot be suspected at this time. According to stock assessment and fisheries data, there is no decline detected in the demersal stock in Argentina and Uruguay and abundance indices show an increase in recent years (since 2014). Fishing effort continues at an unsustainable level in Brazil, the fishery is not well-monitored and conservation measures are insufficient. Conservation measures in Argentina and Uruguay include a total allowable catch limit and regular monitoring of stock status. Based on the potential major threat from overfishing in at least half of its global population, but lack of quantified data, it is listed as **Data Deficient (DD)** with a recommendation to improve fisheries monitoring, including the collection of species-specific data, as well as implement conservation measures to reduce effort in Brazilian fisheries

Assessor(s): Riestra, C., Díaz de Astarloa, J., Vieira, J.P., Buratti, C., Irigoyen, A., Landaeta, M. & Hüne, M.

Reviewer(s): C. Linardich

Facilitators/Compilers: C. Linardich & Fonseca, C.

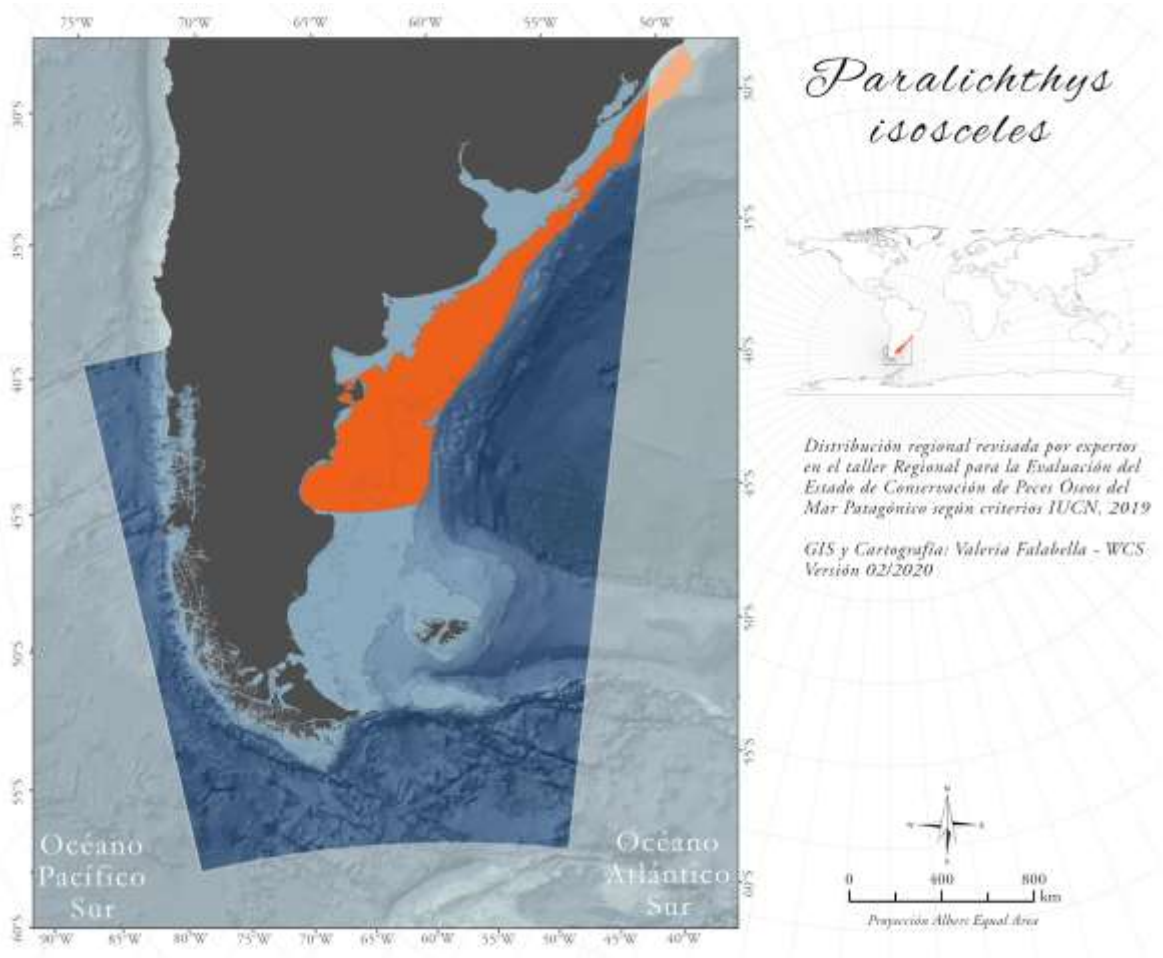
Institution(s): Oceanario de Lisboa

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PLEURONECTIFORMES - PARALICHTHYIDAE - Paralichthys – isósceles (Jordan, 1891)

Common Names: Isosceles Flounder (English), Lenguado (Spanish; Castilian), Linguado-da-Areia (Portuguese)

Geographic Range



This species is distributed in the southwestern Atlantic from Rio de Janeiro, Brazil to the southern part of the San Jorge Gulf, Argentina (Haimovici *et al.* 2008). The depth range is 50-180 metres, but more commonly occurs from 70-100 m (Díaz de Astarloa and Munroe 1998, Díaz de Astarloa 2002).

Population

This species is common throughout its range (Díaz de Astarloa 2002). *Paralichthys isosceles* and *P. patagonicus* are sympatric, but *P. patagonicus* has a higher abundance than *P. isosceles* (J.M. Díaz de Astarloa pers. comm. 2019). It is captured and landed with other *Paralichthys* species, and catches are very low when compared to *P. orbignyanus* and *P. patagonicus*, so there are limited species-specific landings data available (Díaz de Astarloa 2002). For purposes of this assessment, half of the global population is considered to occur in Brazil and the other half in Uruguay and Argentina. There is no decline detected in Argentina and Uruguay and abundance indices show an increase in recent years (since 2014). Demersal fish stocks in Brazil have declined significantly since the 1970s-1980s, but specific statistics for this species are not collected, and its status is poorly understood. *Paralichthys patagonicus* is inferred to have declined by 30-50% in Brazil.

Brazil: In Brazil, it is taken in flounder fisheries, but occurs less commonly in the catch than other *Paralichthys* species that occur there (Díaz de Astarloa *et al.* 2018). Stock assessments are not conducted for Brazil (J. Vieira pers. comm. 2019). The fishery is considered totally exploited or overexploited. Landings from Santa Catarina State represent 60% of the overall catch, and the catch of *Paralichthys* species are mostly comprised of *P. patagonicus*. From 1950 to 2010, landings in Brazil peaked in the 1970s at 6,000 tonnes and then declined to 3-4,000 t through the 1980s, 1990s and 2000s, which represents a 50% decline over a 39 year time period (1971 to 2010). Estimated exploitation rates in southern Brazil indicate catches were no longer sustainable in the mid-1980s (Araújo and Haimovici 2000b). In southern Brazil, annual landings (combined with *P. orbignyanus*) surpassed 2,000 t in 1989 and have declined since (Araújo and Haimovici 2000a, Díaz de Astarloa 2002). Landings of *P. patagonicus* in 1986 were 1,800 t, and from 1986 to 2000, landings fluctuated slightly between 1,000 and 2,500 t. Flatfish fisheries in Brazil were developed during the 1980s when artisanal fisheries moved to shallow coastal waters and started using double-rig trawling gear, the most efficient gear in capturing *Paralichthys* species (Díaz de Astarloa 2002). Effort has remained the same or increased over time and catch per unit effort has declined. A 2005 report indicated severe overexploitation in Brazil based on different indices (Haimovici and Araújo 2005). Data were not collected over the most recent 15 years, but fishing effort has continued, so declines are inferred to have continued. In Brazil, fishing effort actually occurred on the Uruguay population, so some of the catch is reflected in those statistics.

Argentina and Uruguay: In Mar del Plata harbor, where 87% of total flatfish captures are landed in Argentina, *P. isosceles* represents 2.4%-2.6% of the total amount of fish sold (Fabré and Díaz de Astarloa 2001). The Argentine and Uruguayan Common Fishing Zone (Zona Común de Pesca Argentino-Uruguaya), which is where the fishery that targets flatfishes and other demersal fishes operates, includes Uruguay and northern Argentina, with the highest catch occurring off Buenos Aires and declining to the south. Flatfish species represent only 6% of this catch and some vessels changed the target species towards the south to target prawn, so effort declined in recent years. Catch per unit effort (CPUE) from 1999 to 2018 was very variable. Biomass estimates from 1934 to 2018 show somewhat of a decline, but this is highly uncertain as the indices of abundance trend upward since about 2014 or over the past 4-5 years. Data from recent research cruises are expected to improve these model indices. According to the most recent stock assessment of the demersal fishery, it is not overfished and overfishing is not occurring. A Total Allowable Catch (TAC) limit was implemented for this fishery in recent years, and actual total catch has not reached this limit (Rodriguez and Riestra 2019).

Habitats and Ecology

This demersal species occurs on muddy and sandy bottoms where it feeds on fish, cephalopods and crustaceans. It attains a maximum total length of 42 cm, with females generally being larger than males (Haimovici *et al.* 2008). Spawning occurs in spring and summer between October and March (Díaz de Astarloa 2002). Age at first maturity is 2.5 years and longevity is 7 years (Fabré and Cousseau 1990). When applying an age at first reproduction of 2.5 years and longevity of 7 years, its estimated generation length is 4.75 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

This species is landed in commercial fisheries that target demersal fishes (Díaz de Astarloa 2002, Rico 2010, Díaz de Astarloa *et al.* 2018).

Threats

Overfishing is a potential major threat.

Conservation

In Uruguay and Argentina, fishing effort is regulated through total allowable catch limits, a closed-area off El Rincon during the spawning season (October to March) and regular stock assessments monitor its status there. Conservation measures are insufficient in Brazil.

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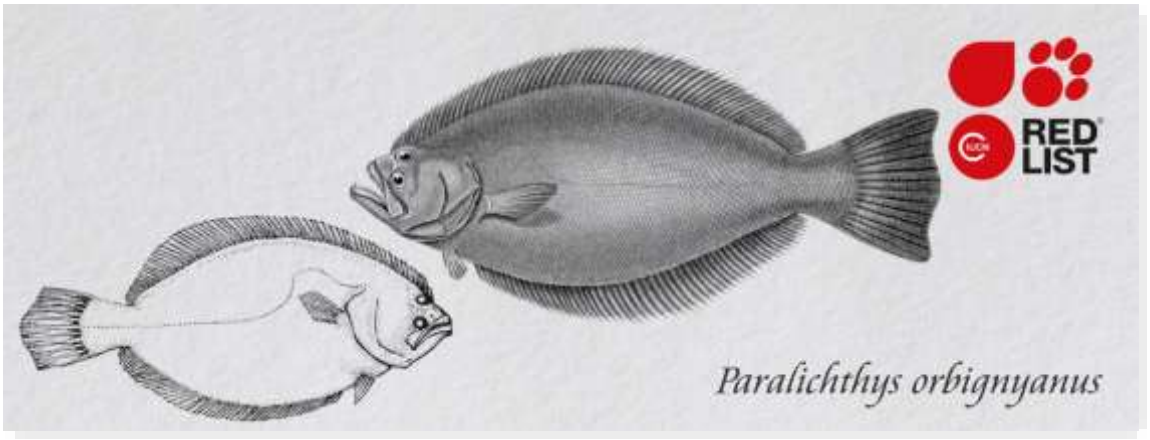


DD – Data Deficient, (IUCN version 3.1)

Assessment Rationale:

This demersal species occurs from southern Brazil to Argentina and is taken in multi-species commercial fisheries that target demersal fishes through much of its range. It is a smaller component of the catch of *Paralichthys* species as compared to catch of the sympatric P. patagonicus. For purposes of this assessment, half of the global population is considered to occur in Brazil and the other half in Uruguay and Argentina. According to landings and catch per unit effort data, the demersal fish stocks of Brazil are inferred to have declined by at least 30% and possibly to 50%. Due to the lack of specific data for this species, an estimate for population decline is not available or cannot be suspected at this time. According to stock assessment and fisheries data, there is no decline detected in the demersal stock in Argentina and Uruguay and abundance indices show an increase in recent years (since 2014). Fishing effort continues at an unsustainable level in Brazil, the fishery is not well-monitored and conservation measures are insufficient. Conservation measures in Argentina and Uruguay include a total allowable catch limit and regular monitoring of stock status. Based on the potential major threat from overfishing in at least half of its global population, but lack of quantified data, it is listed as **Data Deficient** with a recommendation to improve fisheries monitoring, including the collection of species-specific data, as well as implement conservation measures to reduce effort in Brazilian fisheries.

Assessor(s): Riestra, C., Díaz de Astarloa, J., Vieira, J.P., Buratti, C., Irigoyen, A., Landaeta, M. & Hüne, M.

Reviewer(s): C. Linardich

Facilitators/Compilers: C. Linardich & Fonseca, C.

Institution(s): Oceanario de Lisboa

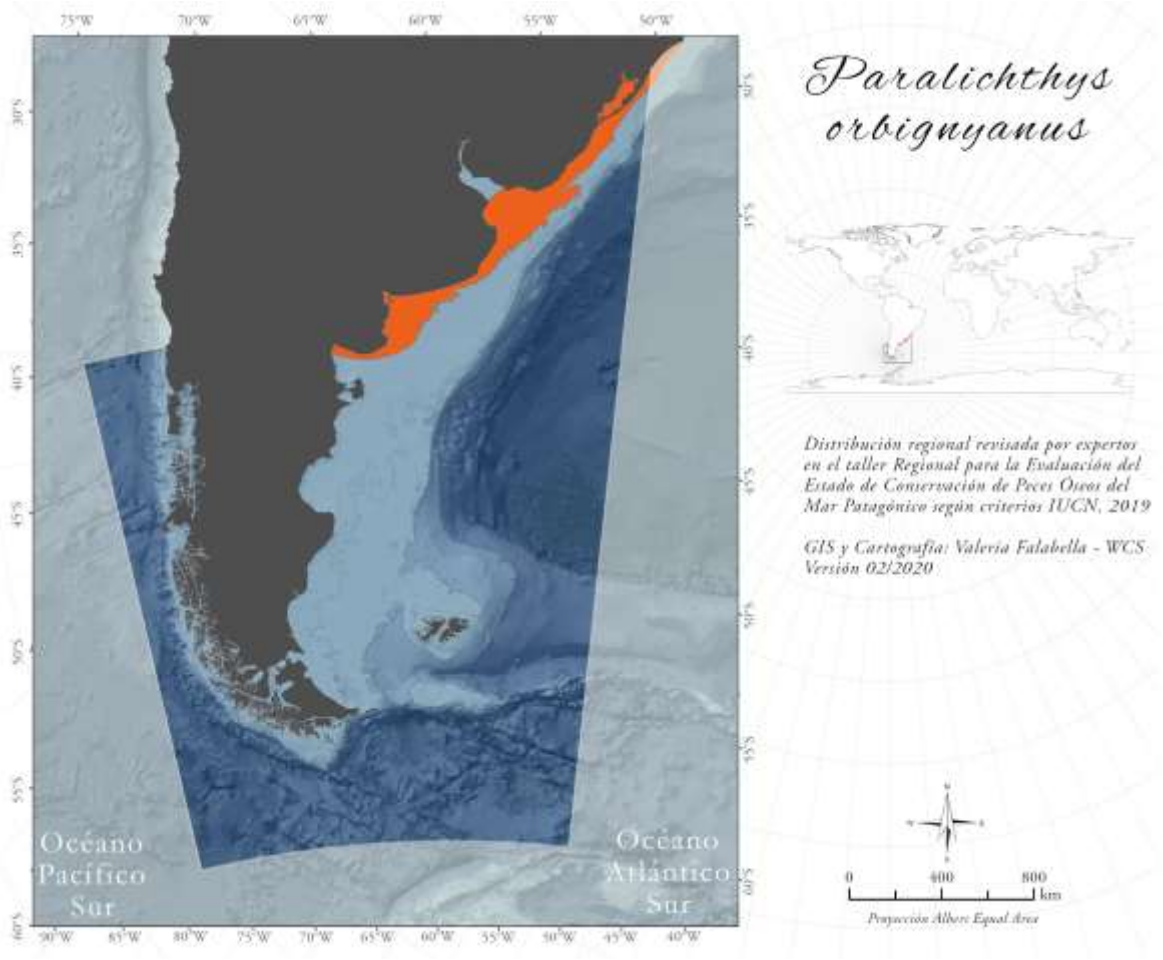
Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PLEURONECTIFORMES - PARALICHTHYIDAE - Paralichthys – orbignyanus (Valenciennes, 1839)

Common Names: Brazilian Flounder (English), Lenguado (Spanish; Castilian), Mud Flounder (English)

Taxonomic Note: Many authors have considered this species to be a junior synonym of *Paralichthys brasiliensis*, a species that is often confused with; however, these species can be distinguished by meristic characteristics and both are currently accepted as separate nominal species (Díaz de Astarloa *et al.* 2006).

Geographic Range



This species is distributed in the southwestern Atlantic from Cabo Frio, Rio de Janeiro, Brazil to the northern part of the Gulf of San Matías, Argentina (Prisco *et al.* 2001, Díaz de Astarloa *et al.* 2006). Along its distribution, it can also be found in estuarine areas and coastal lagoons such as

Lagoa dos Patos of Brazil, Laguna de Rocha of Uruguay, Rio de la Plata estuary, Mar Chiquita coastal lagoon and Rio Negro estuary of Argentina (Prisco *et al.* 2001, Díaz de Astarloa *et al.* 2006). It occurs at depths to 45 metres, but is more common shallower than 20 m (Díaz de Astarloa *et al.* 2006).

Population

This species is common throughout its range (Diaz de Astarloa *et al.* 2006). It is captured and landed with other *Paralichthys* species, and catches are lower than *P. patagonicus*, but higher than *P. isosceles*, and there are limited species-specific landings data available overall (Díaz de Astarloa 2002). For purposes of this assessment, half of the global population is considered to occur in Brazil and the other half in Uruguay and Argentina. There is no decline detected in Argentina and Uruguay and abundance indices show an increase in recent years (since 2014). Demersal fish stocks in Brazil have declined significantly since the 1970s-1980s, but specific statistics for this species are not collected, and its status is poorly understood. *Paralichthys patagonicus* is inferred to have declined by 30-50% in Brazil.

Brazil: In Brazil, it is taken in flounder fisheries, but occurs less commonly in the catch than other *Paralichthys* species that occur there (Díaz de Astarloa *et al.* 2018). Stock assessments are not conducted for Brazil (J. Vieira pers. comm. 2019). The fishery is considered totally exploited or overexploited. Landings from Santa Catarina State represent 60% of the overall catch, and the catch of *Paralichthys* species are mostly comprised of *P. patagonicus*. From 1950 to 2010, landings in Brazil peaked in the 1970s at 6,000 tonnes and then declined to 3-4,000 t through the 1980s, 1990s and 2000s, which represents a 50% decline over a 39 year time period (1971 to 2010). Estimated exploitation rates in southern Brazil indicate catches were no longer sustainable in the mid-1980s (Araújo and Haimovici 2000b). In southern Brazil, annual landings (combined with *P. orbignyanus*) surpassed 2,000 t in 1989 and have declined since (Araújo and Haimovici 2000a, Díaz de Astarloa 2002). Landings of *P. patagonicus* in 1986 were 1,800 t, and from 1986 to 2000, landings fluctuated slightly between 1,000 and 2,500 t. Flatfish fisheries in Brazil were developed during the 1980s when artisanal fisheries moved to shallow coastal waters and started using double-rig trawling gear, the most efficient gear in capturing *Paralichthys* species (Díaz de Astarloa 2002). Effort has remained the same or increased over time and catch per unit effort has declined. A 2005 report indicated severe overexploitation in Brazil based on different indices (Haimovici and Araújo 2005). Data were not collected over the most recent 15 years, but fishing effort has continued, so declines are inferred to have continued. In Brazil, fishing effort actually occurred on the Uruguay population, so some of the catch is reflected in those statistics.

Argentina and Uruguay: *Paralichthys patagonicus* is the most frequently landed species of flatfish in Argentina fisheries, with *P. orbignyanus* and *P. isosceles* also taken, but in smaller amounts (Rico 2010, Díaz de Astarloa *et al.* 2018). The Argentine and Uruguayan Common Fishing Zone (Zona Común de Pesca Argentino-Uruguaya), which is where the fishery that targets flatfishes and other demersal fishes operates, includes Uruguay and northern Argentina, with the highest catch occurring off Buenos Aires and declining to the south. Flatfish species represent only 6% of this catch and some vessels changed the target species towards the south to target prawn, so effort declined in recent years. Catch per unit effort (CPUE) from 1999 to 2018 was very variable. Biomass estimates from 1934 to 2018 show somewhat of a decline, but this is highly uncertain as the indices of abundance trend upward since about 2014 or over the past 4-5 years. Data from recent research cruises are expected to improve these model indices. According to the most recent stock assessment of the demersal fishery, it is not overfished and overfishing is not occurring. A Total Allowable Catch (TAC) limit was implemented for this fishery in recent years, and actual total catch has not reached this limit (Rodriguez and Riestra 2019).

Habitats and Ecology

This demersal species occurs on muddy bottoms (Díaz de Astarloa and Munroe 1998). It frequently uses shallow lagoons and estuaries as nursery grounds, while adults are more common on the inner continental shelf (Prisco *et al.* 2001, Magnone *et al.* 2015). Females grow faster and larger and attain a total length of 103 cm, while males attain 61 cm (López-Cazorla 2005, Radonic and Macchi 2009). Females are thought to live to 7 years of age, with males to 6 (López-Cazorla 2005). It is a batch spawner with a spawning season between October and April (Mellito da Silveira *et al.* 1995). Life history data are not sufficient to estimate a generation length, but based on using proxy data from *Paralichthys patagonicus* and *P. isosceles*, its generation length is expected to be between 5-10 years.

General Use and Trade Information

This species is landed in commercial fisheries that target demersal fishes (Díaz de Astarloa 2002, Rico 2010, Díaz de Astarloa *et al.* 2018). After landings of this species started decreasing, aquaculture was suggested as an alternative (Díaz de Astarloa *et al.* 2002, Radonic *et al.* 2007, Sampaio *et al.* 2008).

Threats

Overfishing is a potential major threat. Some coastal and lagoon areas have been degraded due to increasing eutrophication caused by pollution from agricultural activities, but the impacts to this species are unknown (Magnone *et al.* 2015).

Conservation

In Uruguay and Argentina, fishing effort is regulated through total allowable catch limits, a closed-area off El Rincon during the spawning season (October to March) and regular stock assessments monitor its status there. Conservation measures are insufficient in Brazil.

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Rodriguez, J. and Riestra, C. 2019. Dinámica poblacional del grupo de lenguados en el área Del Río De La Plata, zona común de pesca Argentino-Uruguaya y aguas jurisdiccionales adyacentes al norte de los 39S. Periodo 1934-2018. Inf Téc INIDEP Nº 25/2019. Instituto Nacional de Investigación y Desarrollo Pesquero, Mar del Plata.

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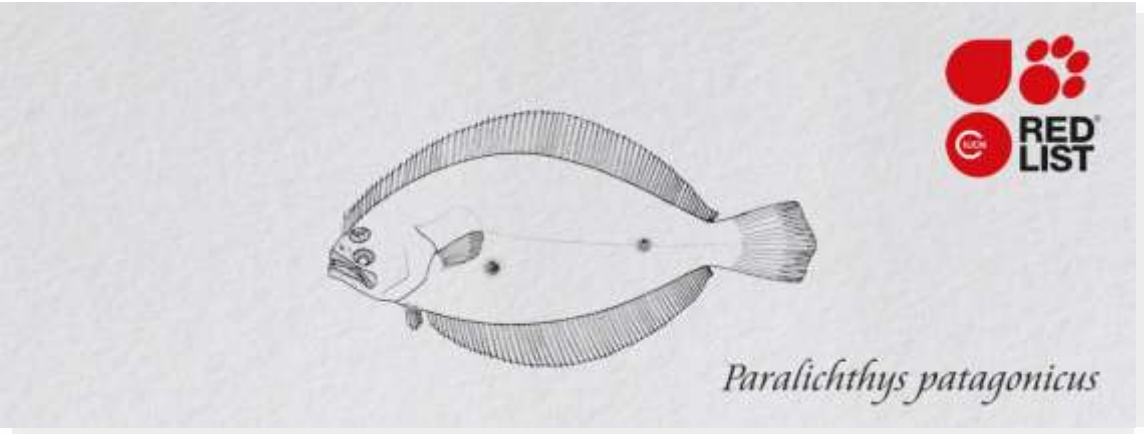


VU – Vulnerable, (IUCN version 3.1)

Assessment Rationale:

This demersal species occurs from southern Brazil to northern Argentina and is taken in multi-species commercial fisheries that target demersal fishes through much of its range. For purposes of this assessment, half of the global population is considered to occur in Brazil and the other half in Uruguay and Argentina. According to landings and catch per unit effort data, the population in Brazil is overexploited and declined by at least 30-60% over the past three generation lengths, or about a 30-year time period. According to stock assessment and fisheries data, there is no decline detected in the demersal fish stock in Argentina and Uruguay and abundance indices show an increase in recent years (since 2014). Fishing effort continues at an unsustainable level in Brazil, the fishery is not well-monitored and conservation measures are insufficient. Conservation measures in Argentina and Uruguay include a total allowable catch limit and regular monitoring of stock status. In addition to fishing, this species is exposed to pollution in estuaries that may be impacting the survivability of some individuals. Based on declines in half of its global population (Brazil), at least a 30% global-level decline is suspected to have occurred over the past three generation lengths; therefore, it is listed as **Vulnerable A2bcd**. It is recommended to improve fisheries monitoring, including the collection of species-specific data, as well as implement conservation measures to reduce effort in Brazilian fisheries.

Assessor(s): Riestra, C., Díaz de Astarloa, J., Vieira, J.P., Buratti, C., Irigoyen, A., Landaeta, M. & Hüne, M.

Reviewer(s): C. Linardich

Facilitators/Compilers: C. Linardich & Fonseca, C.

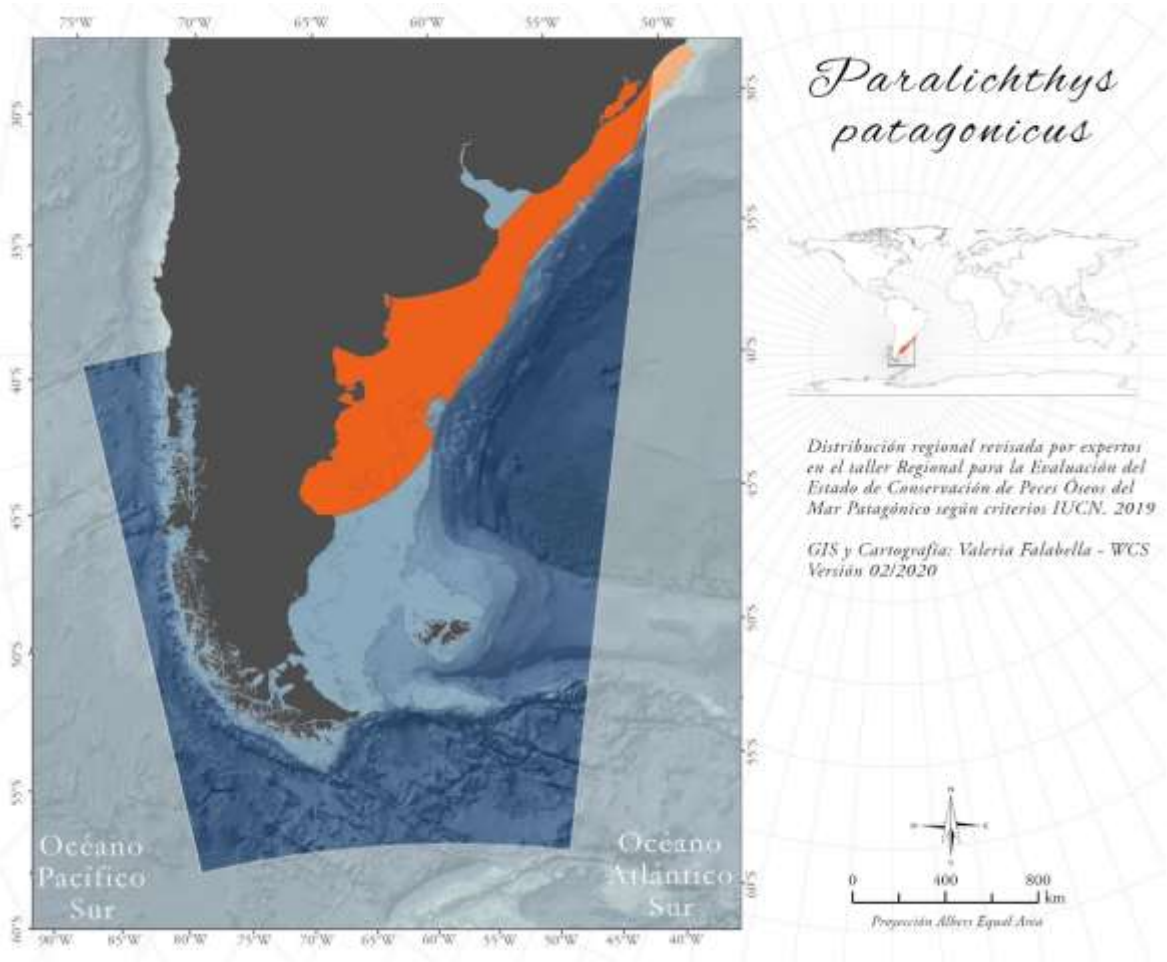
Institution(s): Oceanario de Lisboa

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PLEURONECTIFORMES - PARALICHTHYIDAE - Paralichthys – patagonicus (Jordan, 1889)

Common Names: Patagonian Flounder (English), Lenguado Patagónico (Spanish; Castilian)

Geographic Range



This species is distributed in the southwestern Atlantic from Cabo Frio, Rio de Janeiro, Brazil to southern San Jorge Gulf, Argentina. Records from Chile are misidentifications (J.M. Díaz de Astarloa pers. comm. 2019). It can be found between 6-120 metres depth, but is more common between 70-100 m (Díaz de Astarloa and Fabre 2003).

Population

This species is common and abundant in parts of its range (Díaz de Astarloa and Fabre 2003). *Paralichthys isosceles* and *P. patagonicus* are sympatric, but *P. patagonicus* has a higher abundance than *P. isosceles* (J.M. Díaz de Astarloa pers. comm. 2019). It is captured and landed with other *Paralichthys* species, and catches of *P. isosceles* are very low when compared to *P. orbignyanus* and *P. patagonicus* (Díaz de Astarloa 2002).

Brazil: In Brazil, this species is taken in flounder fisheries (Díaz de Astarloa *et al.* 2018). Stock assessments are not conducted for Brazil (J. Vieira pers. comm. 2019). The fishery is considered totally exploited or overexploited. The longevity, sexual maturity and growth of this species suggest it is susceptible to growth overfishing (Araújo and Haimovici 2000). Landings from Santa Catarina State represent 60% of the overall catch, and the catch of *Paralichthys* species are mostly comprised of *P. patagonicus*. From 1950 to 2010, landings in Brazil peaked in the 1970s at 6,000 tonnes and then declined to 3-4,000 t through the 1980s, 1990s and 2000s, which represents a 50% decline over a 39 year time period (1971 to 2010). Estimated exploitation rates in southern Brazil indicate catches were no longer sustainable in the mid-1980s (Araújo and Haimovici 2000b). In southern Brazil, annual landings (combined with *P. orbignyanus*) surpassed 2,000 t in 1989 and have declined since (Araújo and Haimovici 2000a, Díaz de Astarloa 2002). Landings of *P. patagonicus* in 1986 were 1,800 t, and from 1986 to 2000, landings fluctuated slightly between 1,000 and 2,500 t. In 2010, landings of this species in southeastern Brazil totaled 745 t (Walsh *et al.* 2015), which represents a decline of about 63% from 1989 to 2010. Flatfish fisheries in Brazil were developed during the 1980s when artisanal fisheries moved to shallow coastal waters and started using double-rig trawling gear, the most efficient gear in capturing *Paralichthys* species (Díaz de Astarloa 2002). Effort has remained the same or increased over time and catch per unit effort has declined. A 2005 report indicated severe overexploitation in Brazil based on different indices (Haimovici and Araújo 2005). Data were not collected over the most recent 15 years, but fishing effort has continued, so declines are inferred to have continued. In Brazil, fishing effort actually occurred on the Uruguay population, so some of the catch is reflected in those statistics.

Argentina and Uruguay: *Paralichthys patagonicus* is the most frequently landed species of flatfish in Argentina fisheries, with *P. orbignyanus* and *P. isosceles* also taken, but in smaller amounts (Rico 2010, Díaz de Astarloa *et al.* 2018). The Argentine and Uruguayan Common Fishing Zone (Zona Común de Pesca Argentino-Uruguaya), which is where the fishery that targets flatfishes and other demersal fishes operates, includes Uruguay and northern Argentina, with the highest catch occurring off Buenos Aires and declining to the south. Flatfish species represent only 6% of this catch and some vessels changed the target species towards the south to target prawn, so effort declined in recent years. Catch per unit effort (CPUE) from 1999 to 2018 was very variable. Biomass estimates from 1934 to 2018 show somewhat of a decline, but this is highly uncertain as the indices of abundance trend upward since about 2014 or over the past 4-5 years. Data from recent research cruises are expected to improve these model indices. According to the most recent stock assessment of the demersal fishery, it is not overfished and overfishing is not occurring. A Total Allowable Catch (TAC) limit was implemented for this fishery in recent years, and actual total catch has not reached this limit (Rodriguez and Riestra 2019).

Overall summary: There is some uncertainty as far as estimating population decline on the global-level, but based on landings and catch per unit effort trends, it is clear a decline of about 50-60% has occurred over the past three generation lengths in Brazil. The status of its population in Uruguay and Argentina is somewhat uncertain, but is not expected to have declined as significantly, and is currently understood to be stable. For the purposes of this Red List assessment, Brazil is considered to represent half of its global population; therefore, it is suspected that a global decline of least 30% has occurred over the past three generations, or about 30 years.

Habitats and Ecology

This marine, demersal species can be mainly found on sandy substrates on the continental shelf, and can occur in the lower parts of estuaries as well (Díaz de Astarloa and Munroe 1998). Juveniles feed on crustaceans and fish, while adults feed primarily on fish (Araújo and Haimovici 2000b, Troccoli 2011). It spawns in spring and summer (September – February) with a peak in November. It is a multiple spawner with low fecundity and variable reproductive frequency (Díaz de Astarloa and Munroe 1998, Araújo and Haimovici 2000a, Militelli 2011). Both males and females grow rapidly in the first year of life and females continue growing faster afterwards as well. Females first attain sexual maturity at 33 cm total length and males at 31 cm. The maximum total length for males is 48 cm and females 65 cm. The oldest individual was a 13 year-old female (Araújo and Haimovici 2000a, Díaz de Astarloa and Fabre 2003). In Argentine waters, the maximum total lengths and ages are 60 cm and 18 years for males and 67 cm and 19 years for females (Riestra 2010). Natural mortality was estimated to be 0.3 for females, 0.42 for males and 0.4 for both genders combined (Araújo and Haimovici 2000b). When applying an age at first reproduction of 2-3 years and longevity of 19 years, its estimated generation length is 10-11 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

This is the most commercially important paralichthyid flounder species in the southwestern Atlantic (Walsh *et al.* 2015). It is the main species landed in commercial bottom trawlers operating in southern Brazil to Argentina. It is also taken in artisanal fisheries in the shallow parts of the Uruguayan Rio de la Plata estuary and on the Atlantic coasts of Argentina and Uruguay (Díaz de Astarloa 2002, Díaz de Astarloa *et al.* 2018).

Threats

Overfishing is a major threat to this species. Pollution in the Rio de la Plata estuary has caused some individuals to exhibit deformities (Díaz de Astarloa 1998).

Conservation

In Uruguay and Argentina, fishing effort is regulated through total allowable catch limits, a closed-area off El Rincon during the spawning season (October to March) and regular stock assessments monitor its status there. Conservation measures are insufficient in Brazil. This species was assessed as Near Threatened for the Brazil national Red List initiative in 2013.

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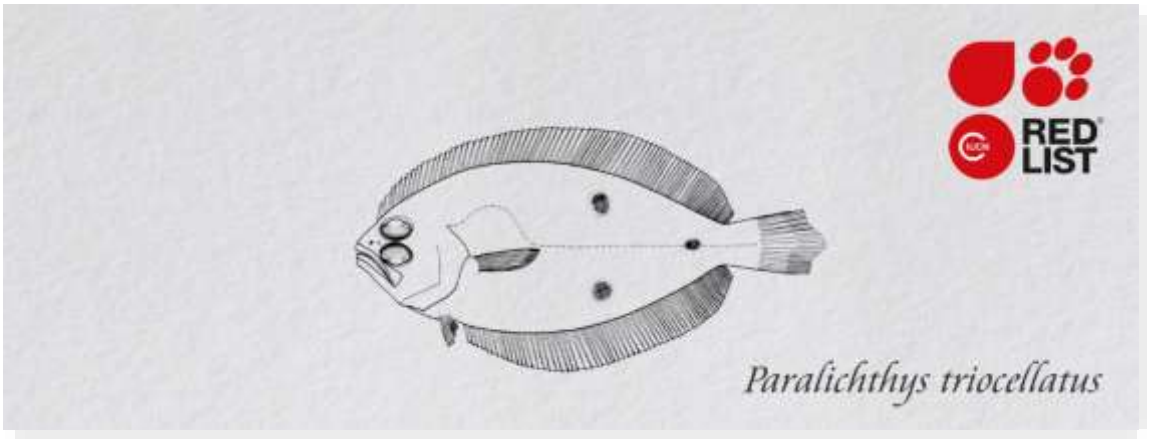


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This demersal species is distributed from southern Brazil to Uruguay. It is taken in commercial fisheries in relatively small amounts. Fishing is not expected to be driving declines approaching a threatened or Near Threatened level at this time; therefore, it is listed as **Least Concern**.

Assessor(s): Díaz de Astarloa, J.

Reviewer(s): Linardich, C.

Facilitators/Compilers: Linardich, C. & Fonseca, C.

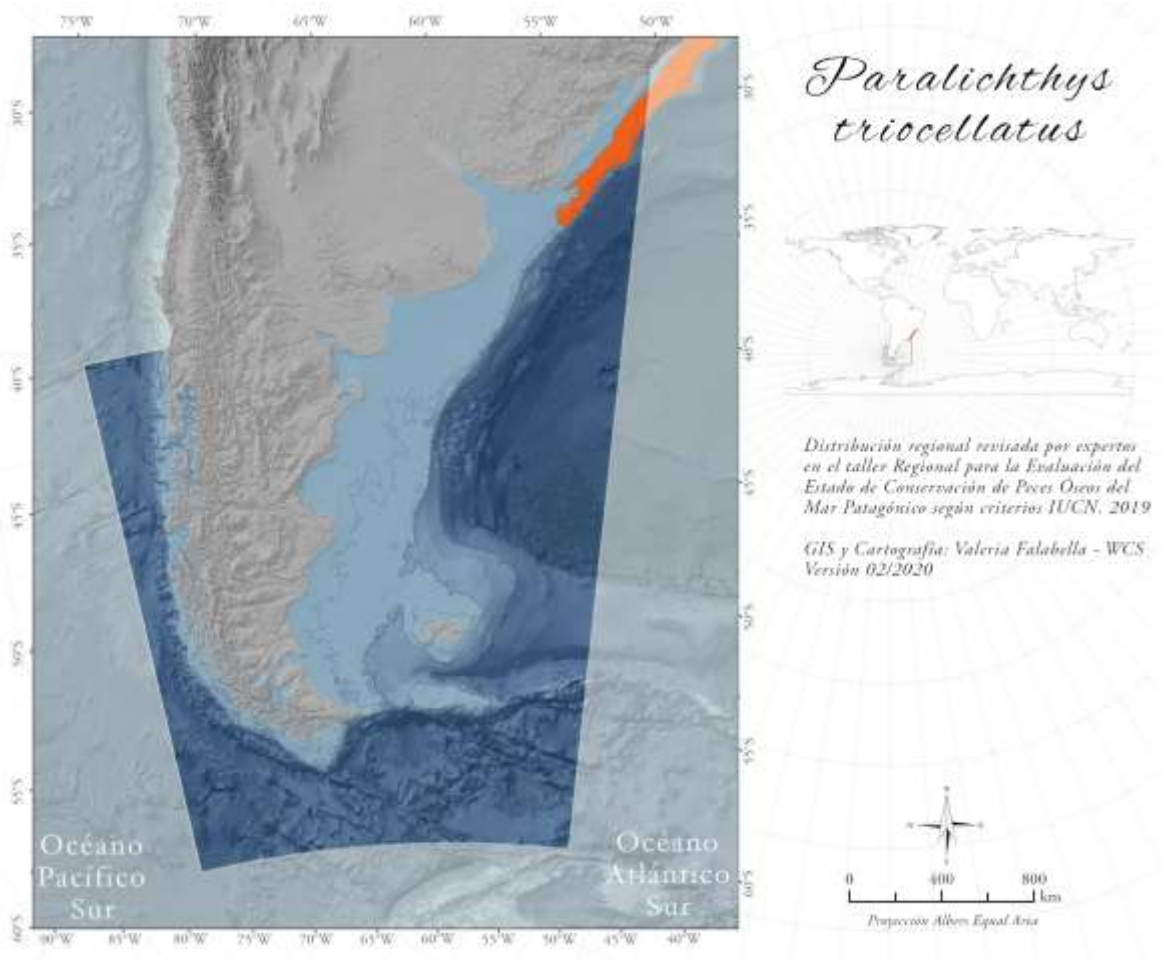
Institution(s): Oceanario de Lisboa

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PLEURONECTIFORMES - PARALICHTHYIDAE - Paralichthys – triocellatus (Miranda Ribeiro, 1903)

Common Names: No common Names

Geographic Range



This species is distributed in the southwestern Atlantic from Rio de Janeiro, Brazil to Uruguay. The depth range is 50-300 metres (Díaz de Astarloa 2002, Haimovici *et al.* 2008).

Population

This species is commonly caught throughout its range (Díaz de Astarloa 2002).

Habitats and Ecology

This demersal species occurs on soft sediments from the continental shelf to upper slope. The maximum total length is 40 cm (Díaz de Astarloa 2002).

General Use and Trade Information

This species is taken in commercial fisheries by otter-trawls and double-rig trawling (Díaz de Astarloa 2002). It is smaller in size and lesser-valued compared to other *Paralichthys* species that are more frequently landed, including *P. patagonicus, P. isosceles* and *P. orbignyanus*.

Threats

Fishing is not expected to be causing declines approaching a threatened or Near Threatened level at this time.

Conservation

In Uruguay, fishing effort is regulated through total allowable catch limits, a closed-area off Ël Rincon during the spawning season (October to March) and regular stock assessments monitor its status there. There are no conservation measures for this species in Brazil.

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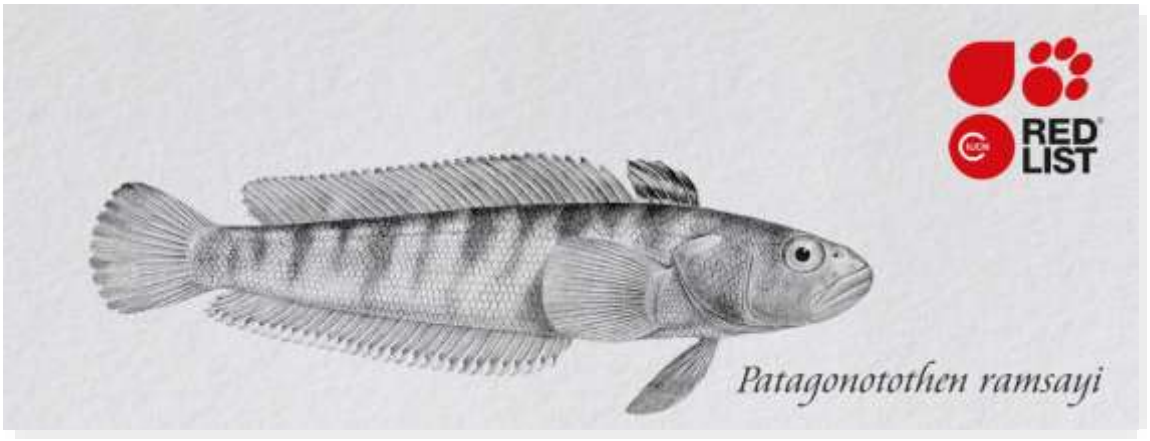


DD – Data Deficient, (IUCN version 3.1)

Assessment Rationale:

This species has a relatively small range on the continental shelf and slope of the southern part of the Patagonia Sea where it plays an important ecological role as a prey item for larger marine species. The majority of its global population is concentrated in southern Argentina, including the Malvinas Islands, where the main fishing ground is located. One generation length is estimated as 10 years. It is relatively slow-growing and late to maturity with relatively low fecundity, which may cause it to be susceptible to declines when facing heavy fishing pressure. Previous to 2006, it was mostly discarded as bycatch in large quantities, beginning in the 1980s. A large-scale, commercial fishery began in 2007 in the Malvinas area. In areas outside the Malvinas closer to the Argentine mainland, it is taken in fisheries in relatively small amounts. According to stock assessment models based on catch per unit effort data and fishery independent trawl surveys, the estimated biomass for the period of 2005 to 2018 was highest in 2005 and then declined by 79% to a low in 2018. According to the 2019 and 2020 survey results, biomass has continued to decline. Biomass trends prior to 2005 are poorly understood, but based on these data, it is suspected that its population has declined by 40-50% on a global-level over the past one and a half generation lengths, or 15 years. In addition, declines in length at maturity and average length of individuals in the survey catch have also occurred. The cause of decline is poorly understood, but may be attributed in part to fishing activity or a shift in the spatial distribution of its abundance to areas adjacent to the Malvinas. Several fishery management measures are in place, catches have been at a relatively low level and it is not considered overfished. Due to the uncertainty associated with the cause of decline and lack of data prior to 2005, it is not possible to estimate the population trend to cover a three generation length period (either in the past or into the future) at this time. It is listed as **Data Deficient** with a strong recommendation to conduct studies to improve the understanding of this decline both within the Malvinas area and areas adjacent to it.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

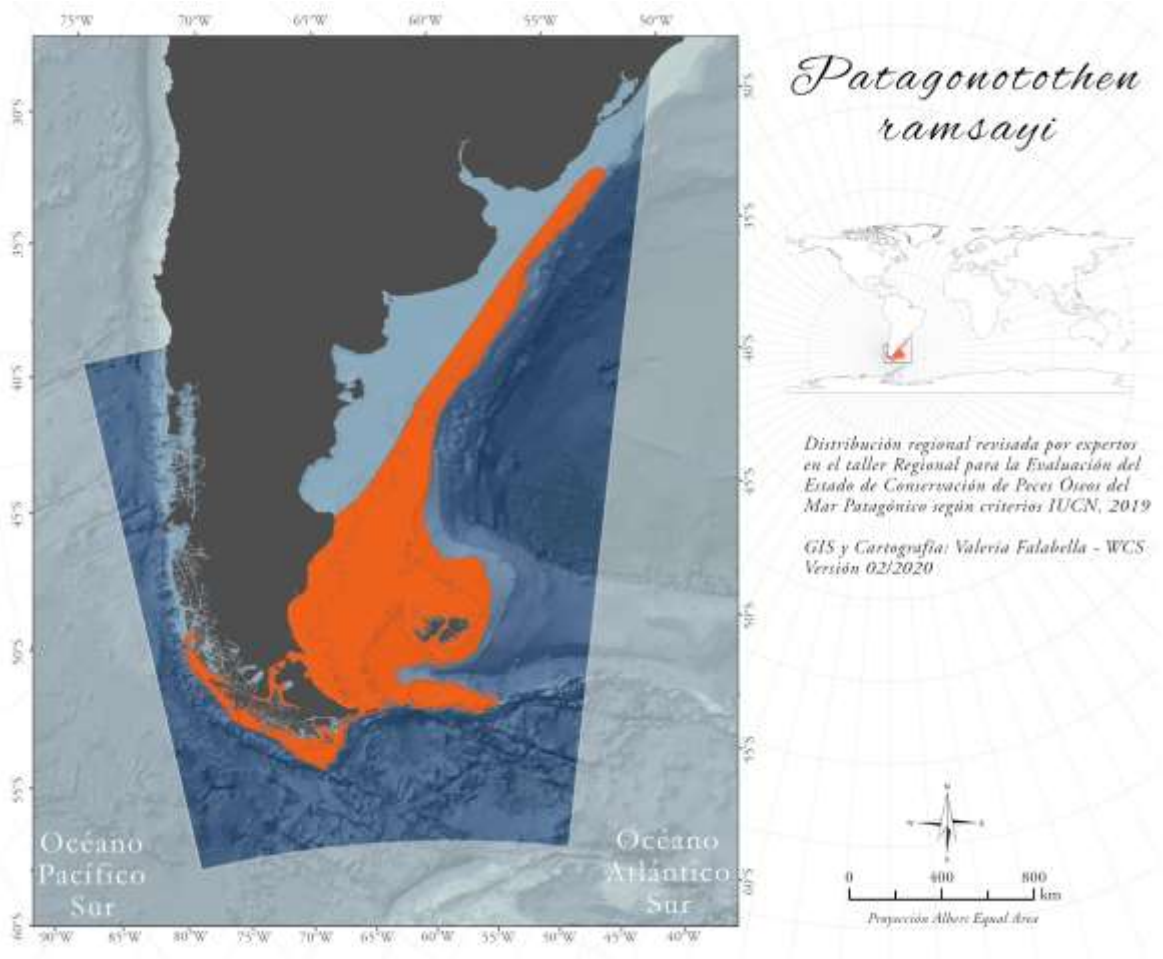
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - NOTOTHENIIDAE - Patagonotothen – ramsayi (Regan, 1913)

Common Names: Longtail Southern Cod (English), Nototenia (Spanish), Nototenia de Ramsay (Spanish), Nototenia coluda (Spanish, Scarlato 2000)

Geographic Range



This species is distributed in the southeastern Pacific from Isla Madre de Dios in Natales, Chile (about 50°S) to Cape Horn and in the southwestern Atlantic from Argentina to Uruguay, including the Malvinas Islands and Burdwood Bank at 55°S (Brickle *et al*. 2005, Irigoyen *et al.* 2018). It has also been recorded in the South Georgia Islands and off the eastern tip of the Antarctic Peninsula (iDigBio database accessed May 2020). The depth range is 50-500 metres.

Population

This species is common and abundant off southern Argentina, but less common off Chile. It has a particularly high abundance in the Namuncurá Burwood Bank Marine Protected Area Plateau (J.M. Díaz de Astarloa pers. comm. 2020). The main fishing ground for this species is located in the Malvinas area, and is taken in relatively small amounts in areas closer to the Argentine mainland. Fishing fleets that operate in international waters off Argentina also take this species. It is not targeted by fisheries in the Pacific part of its range nor in the northern part of the Atlantic range (Uruguay) as it is less common in those areas (C. Buratti, J.M. Díaz de Astarloa and M. Hüne pers. comm. 2019).

The Malvinas stock of southern blue whiting (*Micromesistius australis*) collapsed in 2004-2007 primarily due to overfishing, and following this, the catches and catch per unit effort of this species (rock cod) increased by 20-30 fold between 2002-2004 and 2009-2011 (Laptikhovsky *et al.* 2013). Large amounts of landings of this species were taken by the fisheries operating on the shelf and slope of the Malvinas between 2006 to 2015. Catch peaked in 2010 at 76,451 t and declined thereafter with a particularly steep decline occurring after 2015 to a low of 2,213 t in 2018. Since the fishery began in 2007, catch per unit effort increased until 2010 before declining thereafter. However, effort has been difficult to estimate as this species is not always the main target and has a patchy distribution that varies annually in the area. Vessels may choose to target hake and/or kingclip as they have a higher market value than this species.

Abundances estimates have not been made in any region other than the Malvinas Islands (C. Buratti pers. comm. 2020). Fishery independent scientific trawl surveys have been conducted throughout the Malvinas area since 2010, but were not carried out in the years 2012-2014. The mean length of individuals of this species captured in these surveys declined over time from 22 cm in 2010 to 18 cm in 2020. Length at maturity also declined from 2003 to 2018. These declines are inferred to be caused by fishing pressure (Winter 2019). Survey biomass peaked in 2011 at 1,090,655 t and then declined by 98% to a low of 22,335 t in 2020, or over one past generation length (Ramos and Winter 2020). Modeled biomass has been estimated for the time period from 2005 to 2018. Biomass was highest in 2005 at about 1,250,000 t and mostly declined thereafter to about 265,000 t in 2018, which represents a 79% decline over the past one and a half generation lengths, or 15 years. Biomass trends of this species prior to 2005 are poorly understood. The most recent stock assessment concluded that the stock is not overfished and overfishing is not occurring, but recognized there has been an 8-fold decline in the stock since at least 2005. Despite the situation that fishery catches have been at a relatively low level, no recovery in the stock has been detected (Winter 2019). The continuing decline in biomass may be due to changes in its distribution, but in general, the cause appears to be poorly understood (Ramos and Winter 2020).

Habitats and Ecology

This benthopelagic species inhabits the continental shelf and slope on both sandy and rocky areas. It plays an important ecological role as a prey item to many larger fish predators (Laptikhovsky *et al.* 2013). According to fecundity studies by Brickle *et al*. (2006), fertility is relatively low (J.M. Díaz de Astarloa pers. comm. 2019). The maximum total length is 41 cm.

Spawning occurs on the continental shelf break. Longevity is 14 years and length and age at first maturity is 27.6 cm for males and 24.8 cm for females and approximately 5 years (Brickle *et al.* 2006). When applying an age at first reproduction of 5 years and longevity of 14 years, its estimated generation length is 10 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

The Spanish fleet operating in Malvinas Islands started the commercialization of this species given its large volume of incidental catches (Fuertes-Gamundi *et al*. 2005). This species is targeted and sold for human consumption in Tierra del Fuego and the Malvinas Islands. Since the 1980s, it has comprised a large proportion of the bycatch in squid and finfish trawl fisheries (La Mesa *et al.* 2016). Previous to 2006, it was typically discarded due to its low commercial value (Laptikhovsky and Arkhipkin 2003, Brickle *et al*. 2006), but is now directly targeted by commercial fisheries operating on the shelf off the Malvinas (Arkhipkin *et al.* 2013).

Threats

Overfishing is a potential major threat. This species is relatively slow growing and late to maturity with relatively low fecundity, which may cause it to be susceptible to declines when facing heavy fishing pressure. Climate change could impact the current distribution of this species highly adapted to cold waters (Scarlato pers. comm. 2019)

Conservation

Fishing effort is regulated through an Individual Transferable Quota (ITQ) licensing system, total allowable catch limits, seasonal and area closures and gear restrictions. It occurs in a permanent closed area for the Argentine hake fishery on the Argentine continental shelf around 45°S (Alemany *et al.* 2013) and in the Namuncurá Burwood Bank Marine Protected Area Plateau (J.M. Díaz de Astarloa pers. comm. 2020). Improvements in fisheries management are needed to address biomass declines.

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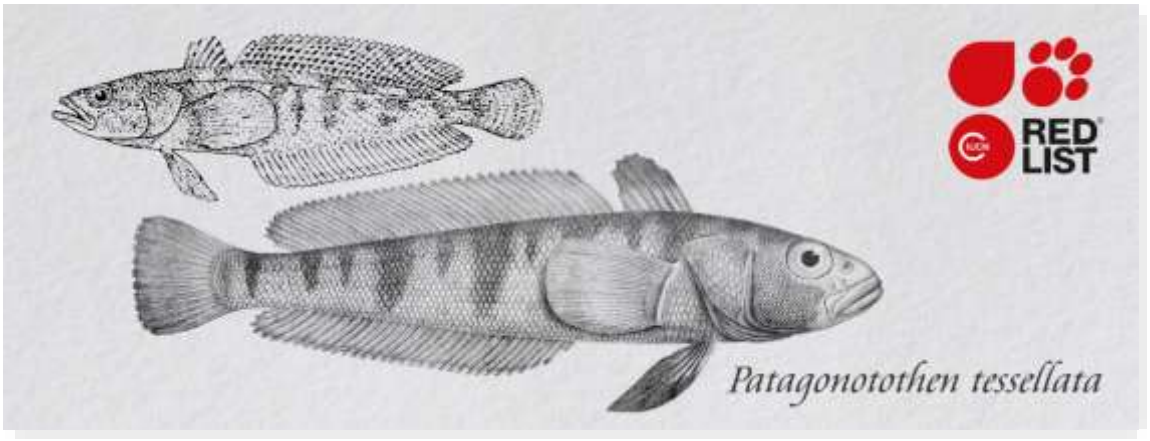


DD – Data Deficient, (IUCN version 3.1)

Assessment Rationale:

This demersal species inhabits nearshore rocky reefs and kelp forests in southern Chile and Argentina and has an estimated generation length of 5 years. The global-level center of its abundance is in the straits of southern Chile. Invasive Chinook salmon now occur throughout the straits of Chile, and this represents a potential major threat, including impacts from competition, predation and disease introduction. The invasion is expected to expand into other parts of its range (i.e. Argentina). The Chilean salmon aquaculture industry, which is the source of escaped individuals, is expected to expand in the near future. The center or the major proportion of its global population is concentrated in the area where this threat is greatest. This threat has been increasing over time, but likely began about 30 years ago. There is not data to quantify population trends at this time; and considering this major threat and the lack of understanding for the likely direct impact, it is listed as **Data Deficient**. It is highly recommended to conduct studies on population trends as well as the impacts from the invasive salmon. Recommended conservation actions include the continued protection of kelp forests from harvest and to improve management of invasive salmon and prevention of escapes.

Assessor(s): Hüne, M., Díaz de Astarloa, J., Landaeta, M., Buratti, C., Irigoyen, A., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

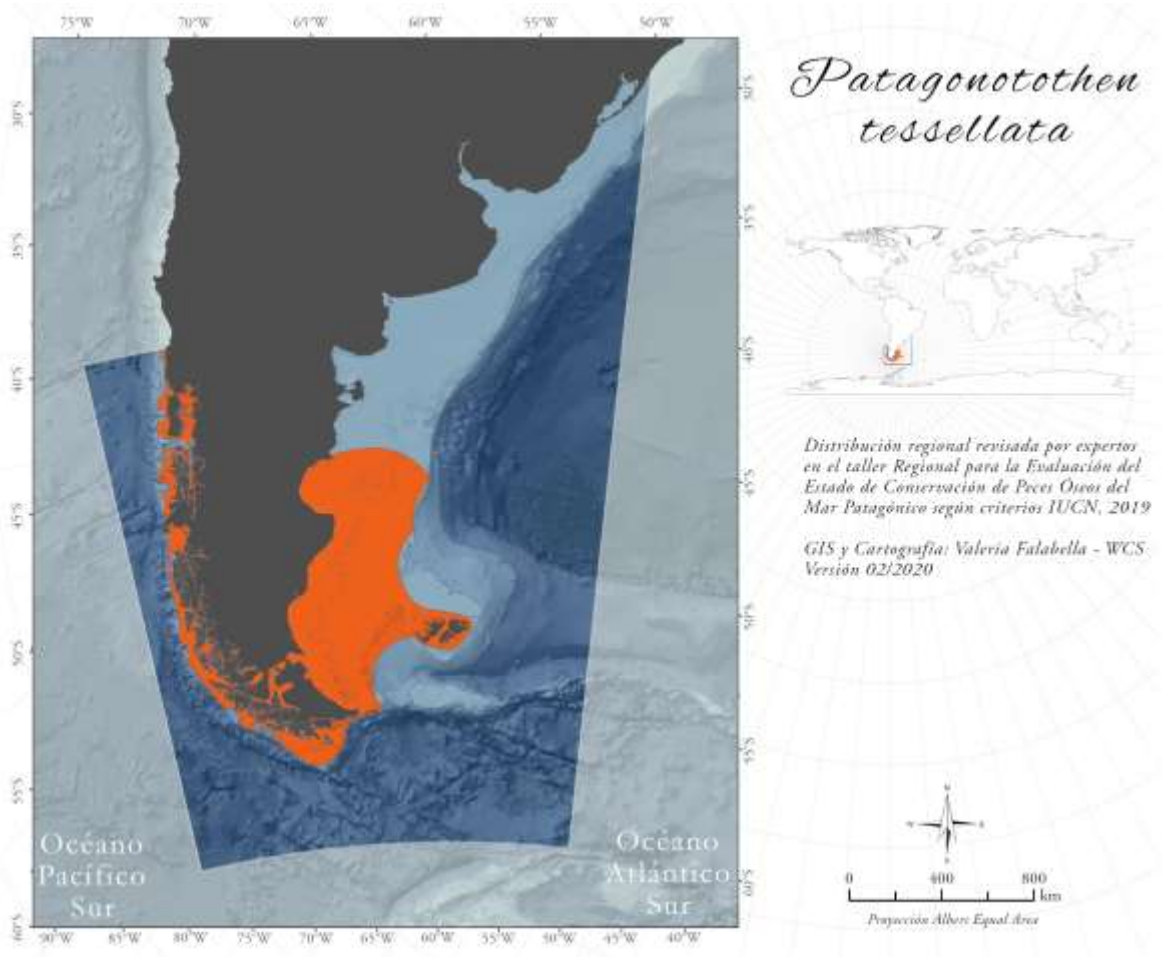
Facilitators/Compilers: Linardich, C., Falabella, V. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - NOTOTHENIIDAE - Patagonotothen – tessellate (Richardson, 1845)

Common Names: Black Southern Cod (English), Róbalo de piedra (Spanish), Trama (Spanish).
Synonyms: Notothenia tessellata Richardson, 1845

Geographic Range



This species is distributed in the southeastern Pacific from Isla Grande de Chiloé, Chile south through the straits into the southwestern Atlantic to the northern San Jorge Gulf, Argentina, including the Malvinas Islands and South Georgia Islands. The depth range is 0-150 metres, but mostly occurs between 0-30 m (M. Hüne pers. comm. 2019).

Population

This species is easily misidentified and confused with juveniles of *Patagonotothen ramsayi*. It is common and abundant in the Pacific part of its range, especially in the southern latitudes (M. Hüne pers. comm. 2019). It is naturally less common in the Atlantic part of its range (J.M. Díaz de Astarloa pers. comm. 2019).

Habitats and Ecology

This benthopelagic species forms schools on nearshore rocky reefs and kelp forests comprised of *Macrocystis* in channel and fjord ecosystems. It is not dependent on kelp, but kelp is a significant component of its habitat preferences. The diet is composed of a variety of benthic invertebrates. The maximum total length is 28 cm, but mostly occurs at less than 20 cm (Hüne and Vega 2015). Females spawn twice per year and males provide nesting and parental care. Longevity is 8 years and length and age at first maturity is 15 cm and 1-2 years (Rae and Calvo 1995). When applying an age at first reproduction of 1-2 years and longevity of 8 years, its estimated generation length is 5 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

This species is not utilized, and has no commercial value. It is discarded as bycatch in grenadier trawl fisheries in the Atlantic part of its range (J.M. Díaz de Astarloa pers. comm. 2019).

Threats

Individuals of the non-native Chinook Salmon (*Oncorhynchus tschawytscha*) escaped from the aquaculture industry into waters of the straits of southern Chile in the mid-1980s and had become invasive throughout the area by 2005. Juveniles and adults of *Patagonotothen tessellata* are frequently consumed by the invasive Chinook. Additional impacts include competition and overlap with the invasive Chinook for food as well as the transfer of disease from consumption of salmon food pellets (Hüne *et al.* 2018). Given its relatively small range, and that the salmon industry is expected to remain the same or increase into the future, this represents a potential major threat to this species.

Conservation

There are no species-specific conservation measures. Part of its distribution overlaps with the Cape Horn Biosphere Reserve, and it occurs in the Francisco Coloane Coastal Marine Protected Area (Hüne *et al.* 2018). The *Macrocystis* kelp forests that this species inhabits are currently well-

protected and no declines in habitat quality have been observed at this time. If commercial harvest of *Macrocystis* is allowed to occur, then this may represent a significant threat to this species (M. Hüne pers. comm. 2019).

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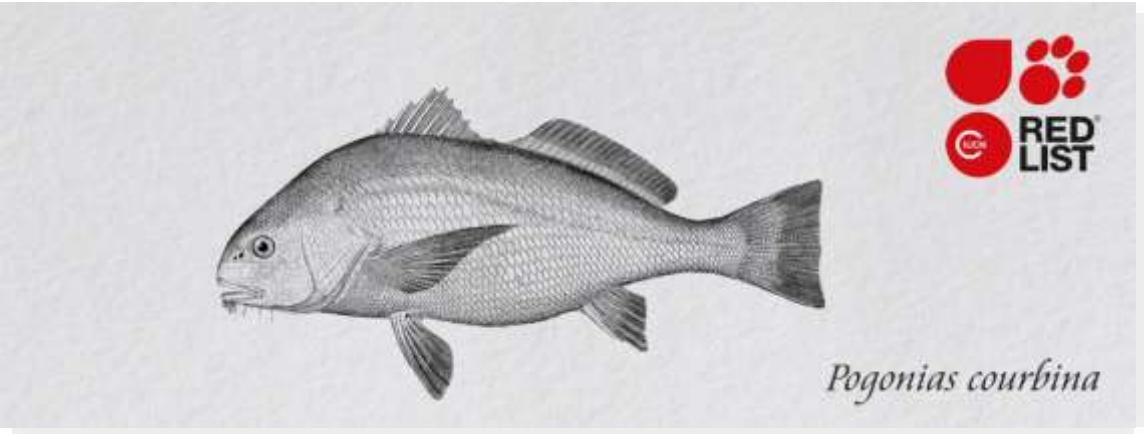


VU – Vulnerable, (IUCN version 3.1)

Assessment Rationale:

This demersal species inhabits and forms seasonal spawning aggregations in shallow coastal waters and estuaries from southeastern Brazil to Argentina. It is a relatively long-lived, large-bodied species that can attain over 140 cm in length and 40 kg in weight and reach over 50 years in age. The estimated generation length is 28 years. It is targeted by commercial, artisanal and recreational fisheries throughout its range. Fisheries targeted spawning migrations in the Patos Lagoon estuary in southern Brazil at a high level from the 1940s to early 1980s, and landings have declined by 88% since 1982, or over the past 37 years. After these four decades of exploitation, only juveniles and small-sized adults are currently captured in the fishery. In Uruguay and Argentina, fishing effort primarily targets spawning aggregations in the La Plata River estuary. Landings in this fishery increased by 260% since 2000, or over the past 19 years, as compared to landings in the period from 1975-1999. The current absence of large individuals in the La Plata River commercial catch and anecdotal observations of declines by Argentine sportfishers, strongly implies that a truncation in age structure and a significant decline in abundance occurred.

This species has intrinsic characteristics, including large body size, long longevity and high vulnerability to capture during predictable spawning/feeding migrations or aggregations, that cause it to be susceptible to large population declines under exploitation. However, its high fecundity and early age at maturity (5-10% of the longevity) favours its resilience to exploitation under adequate fisheries management. The large decline in the southern Brazil fishery that targets this species was caused by years of intense fishing pressure, and that stock has not recovered. This is a clear warning that the fishery operating in La Plata estuary will follow the same path of decline unless urgent and drastic management measures are not implemented in the near future. Based on fisheries data and catch observations over time, it is inferred this species has undergone global-level declines of at least 30-40% over the past one and half generation lengths (about 42 years), and due to insufficient conservation measures, this decline is expected to continue over the next one and half generation lengths. Therefore, it is listed as **Vulnerable A2bd+4bd** with a strong recommendation to improve fisheries monitoring and management.

Assessor(s): Haimovici, M., Chao, L., Vieira, J.P., Buratti, C., Díaz de Astarloa, J., Irigoyen, A., Riestra, C., Landaeta, M. & Hüne, M.

Reviewer(s): Ralph, G. & Linardich, C.

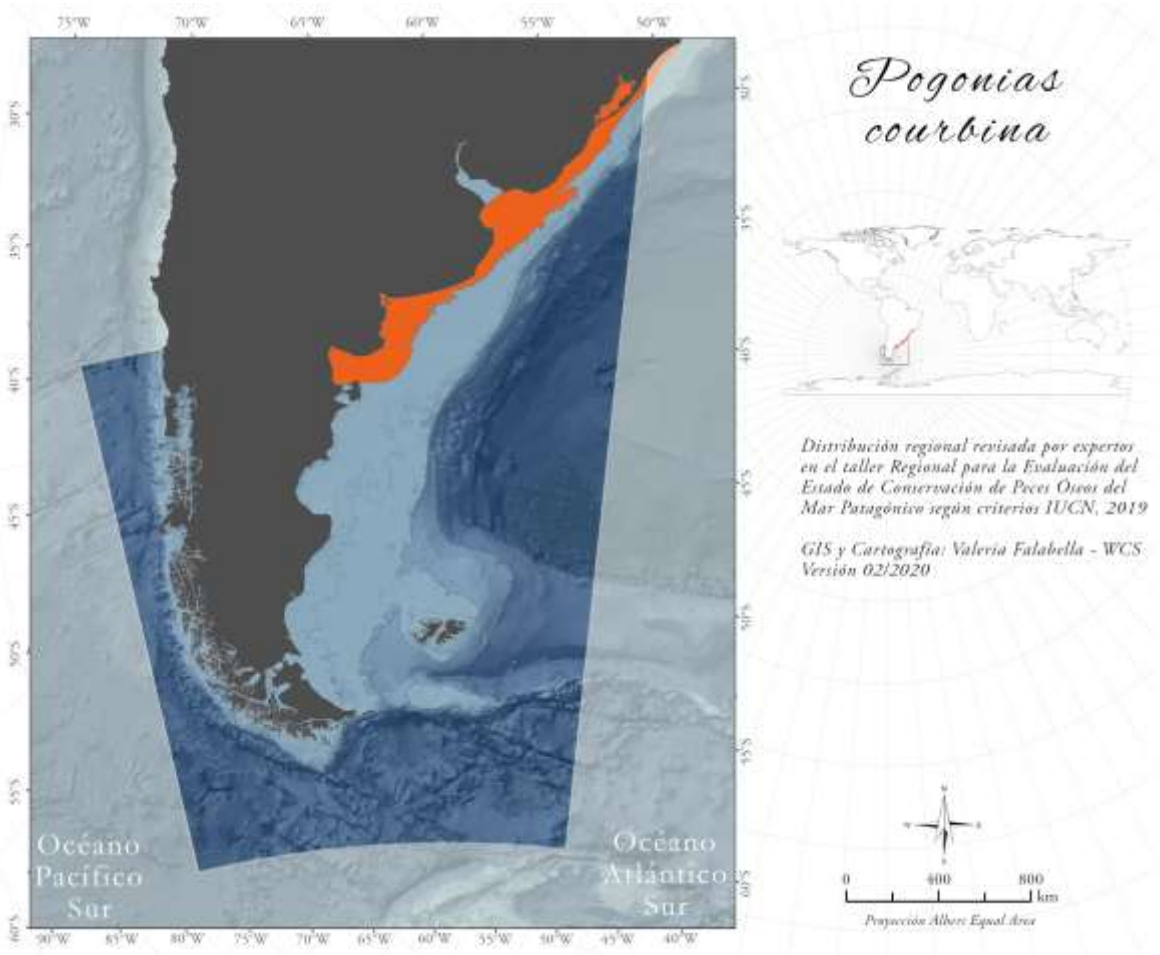
Facilitators/Compilers: Gorman, C. & Linardich, C.

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - SCIAENIDAE - Pogonias – courbina (Lacepède, 1803)

Common Names: Southern Black Drum (English)
Taxonomic Note: This species was recently separated from *Pogonias cromis* (Azpelicueta *et al.* 2019).

Geographic Range



This species is endemic to the southwestern Atlantic and occurs from the State of Rio de Janeiro, Brazil to southern Golfo San Matías, Argentina (Menezes *et al.* 2003, Cousseau and Perrotta 2013, Azpelicueta *et al.* 2019). The depth range is 1 to 50 m (Norbis *et al.* 2006, Nion *et al.* 2013, Azpelicueta *et al.* 2019).

Population

Brazil: At the northern extent of its range in Rio de Janeiro, targeted fishing primarily occurs by small-scale fishers operating in Guanabara Bay, and landings were not recorded until 2012-2015 where a total of 23.4 t were landed (FIPERJ). In São Paulo, 30 t were reported in 1978 and the average annual landings were 1.2 t between 1986 and 2018, which represents a 98% decline over about the past 40 years (PMAP-IP-SP). In Santa Catarina, annual landings of this species averaged 16.7 t from 1986-1995 (Valentini and Pezzuto 2006). Since 2000, only landings from the industrial fishery are available, and no landings of black drum were reported for that fishery. This probably means that this species is only targeted by small-scale fishers in Santa Catarina. In Rio Grande do Sul, annual landings averaged 996 t from 1945 to 1982 and then declined by about 88% to an average of 126 t from 1982-2011 (CEPERG 2012). Most fishing effort occurred by small-scale gillnet fisheries operating in the Patos Lagoon estuary during the late-spring and summer season with occasional catches by bottom trawlers and purse-seiners operating in coastal waters in autumn (Haimovici and Cardoso 2017). The Patos Lagoon fishery targeted spawning aggregations, and that stock withstood intense fishing for at least three decades before collapsing.

Uruguay and Argentina: Official fisheries statistics from Argentina record commercial landings of this species, with landings records beginning in 1935 at 280 t (Sanchez *et al.* 2012). Annual landings averaged 45.7 t from 1975 to 2010 and then increased to 238.5 t from 2011 to 2018, which shows a clear expansion of the fishery has occurred in recent years (SAGyP). Fishing has been primarily by gillnet in recent years. Recreational fishers report that historical catches (circa 1960s) were larger in size and quantity as compared to subsequent years, and this is also true for catch in sport fishing tournaments over time (Irigoyen *et al.* 2018, A. Irigoyen pers. comm. 2019). In Uruguay, this species has been targeted and exported by commercial fisheries, probably by bottom trawlers, for at least the past 30 years. Annual landings increased significantly over the past two decades from an average of 267 t in 1977 to 2000 to 561 t in 2001-2018.

The most significant catches for Uruguay and Argentina occur during the spawning season from December to January at the mouth of the Río de la Plata (Azpelicueta *et al.* 2019). Combined landings by Uruguay and Argentina increased by 260% since 2000 in part to meet demand for the export market to Brazil (Urteaga and Perrotta 2001). This intensified fishing on spawning aggregations is very likely to lead to a similar collapse situation as occurred in the Patos Lagoon in Brazil unless effective management is enforced in the near future. The absence of large individuals in the La Plata River and Patos Lagoon estuaries based on commercial fishing and anecdotal observations of sport fisheries, allow to safely assume that a truncation in the age structure and a significant decline in the abundance occurred.

A recent study by Machado *et al.* (in submission) observed a very high genetic diversity and no genetic structure between individuals sampled from Patos Lagoon and individuals from La Plata River estuary. This suggests there is some connectivity between the two systems. This may favour the resilience of the population, and decrease the extinction risk of local stocks. However, the slow recovery after the fisheries collapse at Patos Lagoon indicates that the recolonization process is slow and that the stocks in these two regions can be considered as unique stocks in terms of fishery management.

Overall summary:

There are gaps and uncertainties in reported landings along this species' range, but the available landings statistics are considered adequate to have a global picture of its abundance trends. Due to its large size (high value) and vulnerability to exploitation during spawning, it is intrinsically susceptible to large population declines when under intense fishing pressure. According to landings trends, its population in Brazil declined by about 80% over the past four decades. Landings in Uruguay and Argentina have increased significantly over the past two decades due

to increased fishing effort and targeting of aggregations, and this is not expected to be sustainable. Based on fisheries data and catch observations over time and the life history of the species, there is strong evidence it has undergone global-level declines of at least 30-40% over the past one and half generation lengths (about 42 years), and due to insufficient conservation measures, this decline is expected to continue over the next one and half generation lengths.

Habitats and Ecology

This is a demersal, estuary-dependent species. It utilizes estuary habitats as nursery areas, especially the coastal lagoons of Lagoa dos Patos, Laguna de Rocha, Río de la Plata and Mar Chiquita (Azpelicueta *et al.* 2019). It primarily feeds on large benthic invertebrates, including bivalves and crabs (Blasina *et al.* 2010). Juveniles occurs in tide pools on rocky coasts of the Río de la Plata (Abella *et al.* 1979). This species is a group-synchronous, broadcast spawner that forms aggregations in less than 10 m of water near the mouths of bays and estuaries (Fitzhugh *et al.* 1993). Spawning takes place in the spring from October to December in Río de la Plata (Macchi *et al.* 2002) and between October and March in southern Brazil (Haimovici 1998). It can attain at least 117 cm total length (Azpelicueta *et al.* 2019). Individuals of over 140 cm in length were frequent in the commercial catches along southern Brazil (Haimovici 1997) and in recreational fishing along the Buenos Aires province in Argentina.

In the Patos Lagoon estuary, first maturity was attained at around 4-5 years and 65 to 80 cm total length in the early 1980s (Haimovici 1998). Size and age at maturity decreased in the 2010s to 45-50 cm total length at ages 2-3 years (Santos *et al.* 2016, Haimovici and Cardoso 2017). Older individuals reported were over 50 years of age (Haimovici 1998, Chao *et al.* 2015). Age a first maturity in the La Plata estuary was estimated as 3-5 years by Urteaga and Perrota (2001). When applying an age at first reproduction of 4 years and longevity of 52 years, its estimated generation length is 28 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

This species is targeted by small-scale, industrial and recreational fisheries in estuarine and coastal waters throughout its range. It is targeted during the spawning season at the mouth of the Río de la Plata and the inshore waters of Samborombón Bay in the Río de la Plata estuary (Azpelicueta *et al.* 2019). In Argentina, it is taken in a multi-species fishery.

Threats

Overexploitation is a major threat to this species. Life history characteristics, including predictable aggregate spawning behaviour, long longevity and slow recovery cause it to be particularly susceptible to declines under heavy exploitation. As this species is dependent on estuaries, it may also be impacted by anthropogenic activities that frequently cause pollution and habitat degradation within these systems, but the impact is not known at this time.

Conservation

In Argentina, there are at least five fishing regulations in place to reduce effort, including a restriction that allows this species to be taken only by gillnet (in place since 1999) as well as the implementation of area closures. However, landings increased three-fold in the past two decades. There are some protections from fishing in the Mar Chiquita Lagoon, which is a biosphere reserve. In Brazil, this species was included in the National List of Endangered Species of the Environmental Ministry as 'Endangered' (MMA 2014), with the fishery being prohibited.

Although nominally protected along most of its range, fishing regulations do not seem sufficient to reduce declines or allow recovery. An action plan is needed to integrate management and international cooperation amongst Brazil, Uruguay and Argentina and designate fishery exclusion areas (no-take zones), especially to reduce fishing on spawning aggregations (Azpelicueta *et al.* 2019). For example, the collapsed fishery in Patos Lagoon estuary targeted aggregations entering the lagoon during or after spawning (Haimovici and Cardoso 2017), and both Argentinian and Uruguayan fisheries in the Rio de la Plata estuary also now target spawning aggregations

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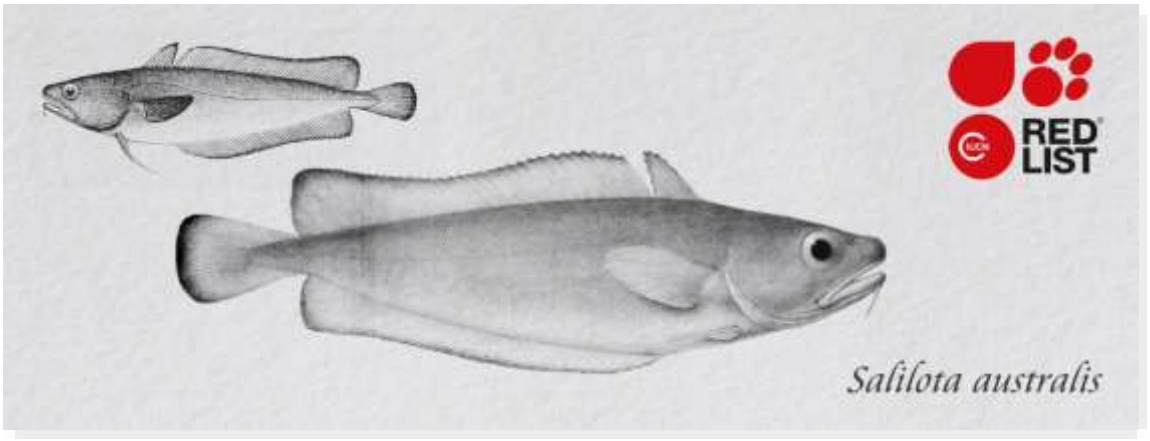


DD – Data deficient, (IUCN version 3.1)

Assessment Rationale:

This widely distributed, demersal species has an estimated generation length of 10 years. It is a valued bycatch species retained in bottom trawl fisheries throughout its range. Exploitation of spawning aggregations increases the susceptibility of this species to declines. On the Pacific coast, catch has declined, however, this is reflective of declines in effort caused by fishery regulations that reduced the number of fishing vessels. On the Atlantic coast, it is not currently considered overfished, and catches in recent years have been low. Due to the lack of fishery independent survey data, biomass estimates are conducted under data-poor conditions, which causes high uncertainty. The currently available biomass estimates show it has declined or fluctuated widely over much of the past three generation lengths with a slightly increasing trend in recent years. It is not completely understood whether fishing effort will remain the same or decline, but some regulations have been implemented to reduce fishing effort on the spawning grounds. Due to the potential major threat from fishing, and that there has been some poorly understood level of global population decline since the 1990s, it is listed as **Data Deficient**. Fishery independent surveys are needed as well as research on population structure.

Assessor(s): Buratti, C., Di Marco , E., Giussi, A., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C. & Roa-Varón, A.

Contributor(s): Campagna, C.

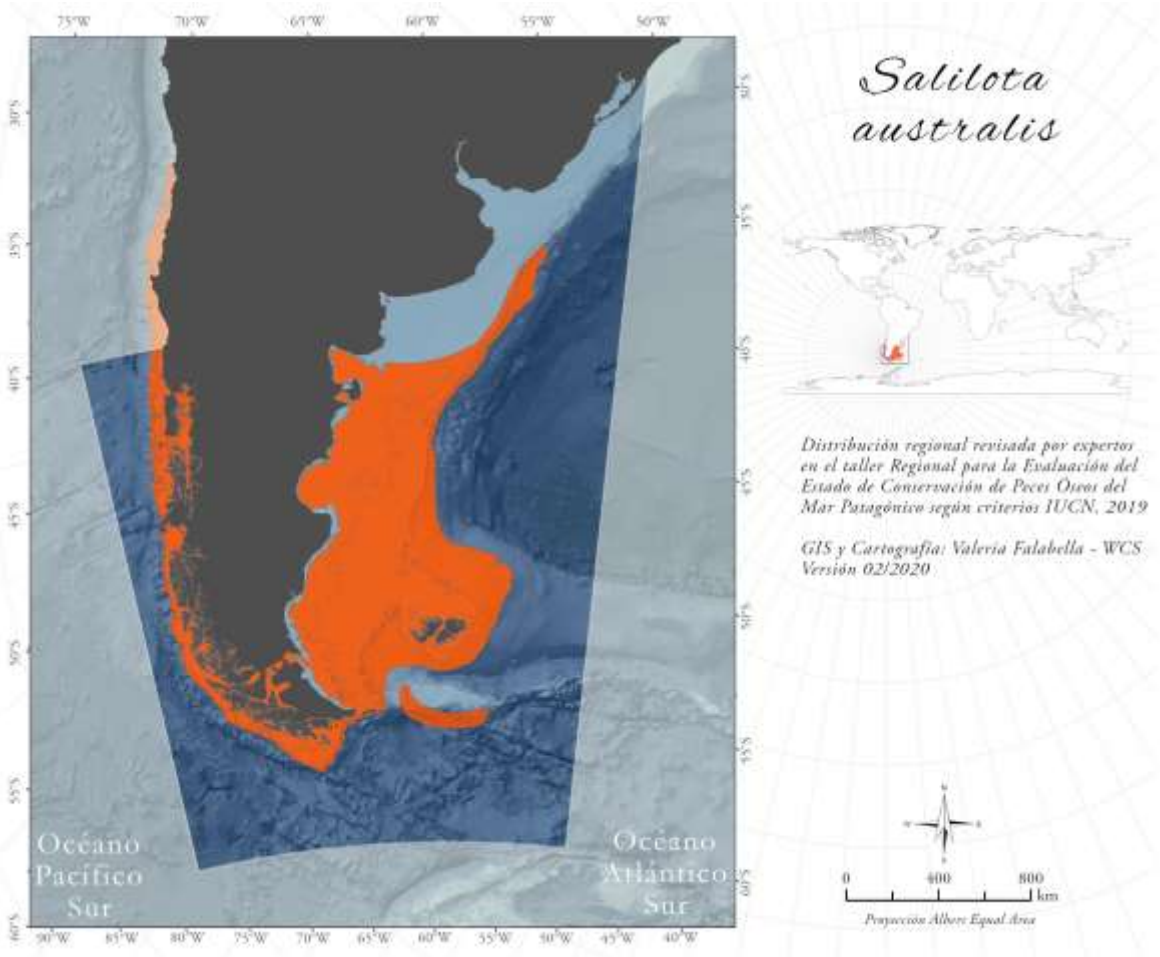
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - GADIFORMES - MORIDAE - Salilota - australis (Günther, 1878)

Common Names: Red Cod (English), Bacalao Austral (Spanish; Castilian), Tadpole Codling (English)

Geographic Range



This species occurs in the southeast Pacific at approximately 40°S off Chile to the Magellan Straits and into the southwest Atlantic north to Uruguay, including the Malvinas Islands (Brickle *et al.* 2011, Follert *et al.* 2017). Records from further south are considered waifs. The depth range is 8-1,000 metres.

Population

This species is common and abundant.

Pacific: Over the past five years, catch on the Chilean coast has been about 500 t, and overall, it represents a much smaller proportion of the global catch as compared to the Atlantic. There is likely some level of connectivity between the populations from the Pacific to the Atlantic. There is likely just one stock in the Pacific. Estimates of biomass are not available for the Pacific coast. Landings declined since 1988 from 8,000 t to 500 t, which represents about a 94% decline over the past three generation lengths. However, effort has also been declining during the same time period, and therefore, this trend is considered to explain the catch trends, and does not reflect a population decline. Effort was reduced due to fishing regulations introduced over the past six years, and effort is now at a relatively low level. However, this species has been increasingly targeted by the austral demersal fleet in Chile over the past decade (Follert *et al.* 2017).

Atlantic: Fishing for this species on the Atlantic coast occurs mostly in areas around the Malvinas Islands. From 1984-2017, in Argentina, landings by the Argentine and foreign fleets varied widely over time. Catch declines are related to changes in effort being directed towards other species. The exploitation of this species is highly related to the fishing effort directed towards hoki (*Macruronus magellanicus*). As hoki abundance has declined over time, the effort towards this species increased. The Argentine fishery began exploiting this species in 1980 and it is typically caught during the spawning season when it occurs in high densities. Largest catches occurred in the late 1990s, with a peak in 1999 of 16,500 t and then gradually declined by 70% to around 5,000 t in 2015-2017. Catch per unit effort declined by 52% from 49.69 kg/h in 1998 to 23.82 kg/h in 2017 (data are not available prior to 1998). Biomass declined by 47% over the past four generation lengths from 201,748 t in 1980 to 106,656 t in 2018, but there were periods of some stability (2002-2007 and 2012-2018) and a slight upward trend has been recorded in recent years (2014-2017). Catches during the period from 1984 to 2000 and 2007 to 2013 were too high, and this may have contributed to biomass decline. Catches declined in 2014 to 2017 and biomass increased slightly. Currently, catches are only 3% of the biomass. The most recent Argentine stock assessment concluded overfishing was not occurring as abundance levels remained above the target and biological limit reference points (Di Marco 2019). The Malvinas fishery is not currently overfished but has been in recent years. Biomass has declined or fluctuated widely since at least 1987, although there has been an increasing trend in recent years. Recent catches are low at nearly 2.5% of the biomass. The average length and age at maturity of the individuals in the Malvinas catch has declined since 1988 (Winter 2018).

This species is not directly targeted, but retained as bycatch, and data needed to accurately estimate relative abundance are difficult to obtain because fishery independent research surveys have not been conducted. Due to this, both stock assessments (Winter 2018, Di Marco 2019) are conducted under data-poor conditions. The high amount of uncertainty associated with these estimates prevents an estimate of global population decline at this time, but concern remains that some level of decline has occurred over the past three generation lengths (C. Buratti, A. Giussi and E. di Marco pers. comm. 2020).

Habitats and Ecology

This demersal species occurs on soft bottoms on the continental shelf and slope. It migrates to form spawning aggregations on the continental shelf edge near areas of upwelling associated with the Malvinas Current in September-October and then returns to feeding grounds on the Patagonian Shelf (Arkhipkin *et al.* 2010). The maximum total length is 96 cm (Brickle *et al*. 2011). Age at first maturity is 4 years and longevity is 16 years (Wöhler *et al*. 2004, Winter 2018, Di Marco

2019). When applying an age at first reproduction of 4 years and longevity of 16 years, its estimated generation length is 10 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

This species is a valued bycatch species taken in mixed-species bottom trawl fisheries.

Threats

Overfishing is a potential major threat to this species. It is an aggregate spawner, and heavy exploitation on these aggregations increases the susceptibility of this species to rapid declines (Brickle *et al.* 2011).

Conservation

There are fishing regulations in place in Chile. Fishing area restrictions were put in place by the Argentine government in 2002 and total catch limits and vessel permitting have been in place since 2008 (Di Marco 2019). In 2009, fishing regulations were put in place on the Malvinas spawning grounds.

Field surveys are needed to improve the accuracy of abundance indices and research on population structure would also be beneficial.

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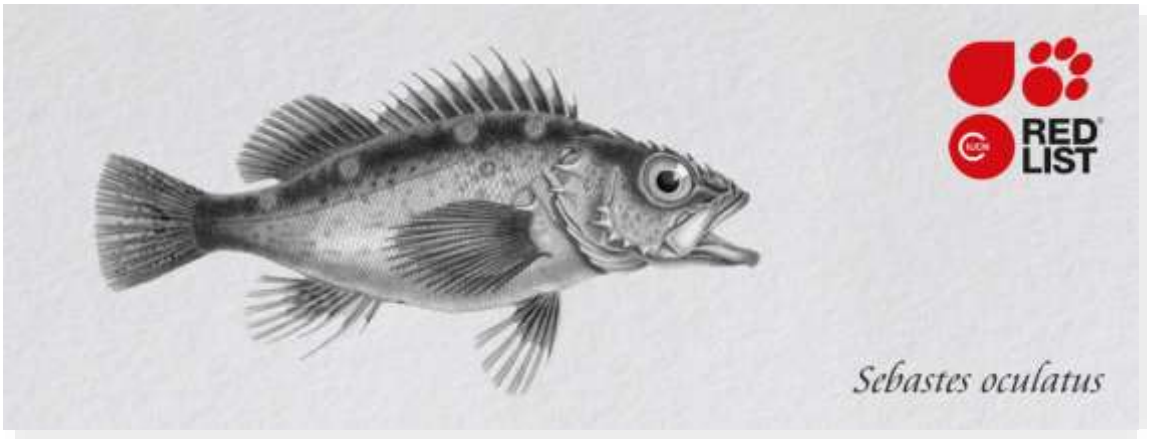


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This demersal, reef-associated species is common and abundant through much of its range. It is taken in fisheries at relatively low levels and may be impacted by invasive salmon. Global-level declines are not considered to be approaching a Near Threatened or threatened level at this time; therefore, it is listed as **Least Concern**.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

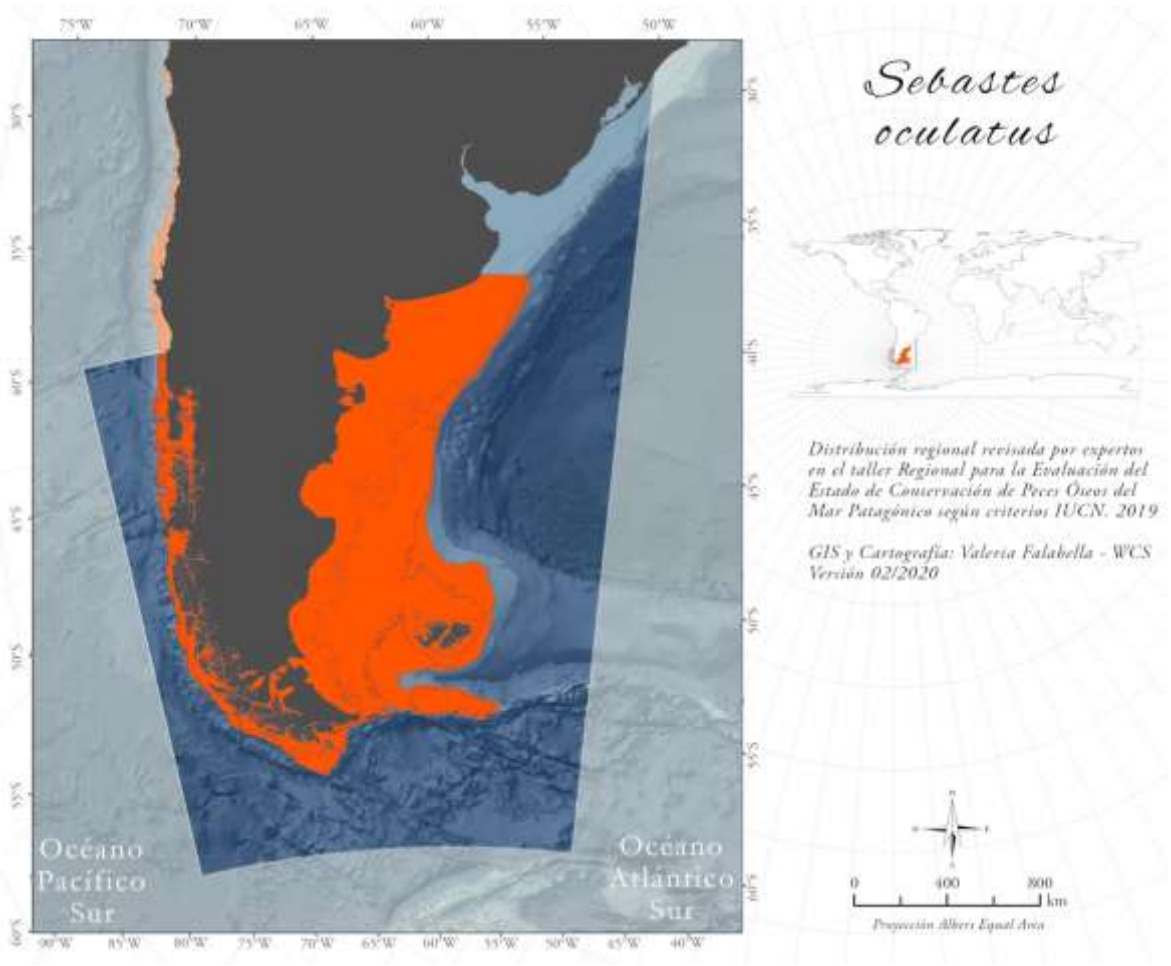
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - SCORPAENIFORMES - SEBASTIDAE - Sebastes – oculatus (Valenciennes in Cuvier & Valenciennes, 1833)

Common Names: Patagonian Rockfish (English), Cabrilla (Spanish; Castilian), Scrofalo (Spanish; Castilian)

Geographic Range



This species occurs in the southeast Pacific from 10°S off Peru to the southern tip of Chile and in the southwest Atlantic north to Buenos Aires Province, Argentina around 38°S, including the Malvinas Islands (Rocha-Olivares *et al*. 1999, Barrientos *et al.* 2006, Nuñez *et al.* 2010, Buratti 2020, M. Landaeta pers. comm. 2020). The depth range is 1-500 metres, but primarily occurs between 61-226 m (Buratti 2020).

Population

This species is common and abundant in relatively shallow waters (0-50 m) in fjords within its range (Irigoyen *et al*. 2013, Venerus *et al*. 2016), but also has a large abundance on the mid- to outer continental shelf area off Argentina. It occurs in low densities in the Malvinas (Buratti 2020). Abundance may be lower towards the southern portion of its range. Larvae are very abundant (Landaeta *et al.* 2015, Castillo-Hidalgo *et al.* 2018). It is easily confused with *Helicolenus dactylopterus*. Spearfishing activity in central Chile may cause localised declines.

On the Atlantic coast, it is most abundant on rocky reefs to 70 m depth south of 44°S. According to scientific surveys conducted between 34ºS and 48ºS from 1993 to 2019 to monitor Argentine hake and Argentine squid, the highest relative densities of this species (*Sebastes oculatus*) were recorded south of 43ºS between 125-150 metres (Buratti 2020). The population off Argentina is separated genetically by depth range, with a shallow, coastal population and an offshore shelf population (Venerus *et al*. 2013). According to long term data collected during recreational angling competitions, catch per unit effort of this species has declined over time in Argentina (Venerus and Cedrola 2017).

Habitats and Ecology

This demersal species inhabits coastal, rocky reefs as well as cold-water coral reefs. The maximum total length is 41 cm (Venerus *et al*. 2016). In Argentina, it most frequently occurs on the mid and outer continental shelf as well as on coastal, rocky reefs of Patagonia (Buratti 2020). It is mainly a carcinophagous fish that feeds on benthic or demersal-benthic prey, although with an important contribution of some demersal fish species. The reproductive strategy includes internal fertilization. Males and females develop an anatomically complementary genital papillae to improve the efficiency of the spermatic passage. The different morphology of the papillae is the only external sexual dimorphism found. The reproductive cycle is annual with a synchronous cycle for males and females. The functional maturity of males and the stage of migration of the nucleus in females has its peak of greatest abundance in early spring, copulation and fertilization would occur approximately at the same time. The gestation lasts about one month and the parturition occurs towards the end of spring. The average relative fecundity was estimated at 134.14 oocytes/gr^{-1} and the total lengths at first maturity is between 16 and 24 cm (Marcinkevicius 2019).

General Use and Trade Information

This species is not directly targeted, but is taken as bycatch in longline fishing fleets and offshore commercial trawl fisheries, especially the Argentine hake fishery (Buratti 2020). Throughout its range, it is occasionally landed (retained as bycatch) at relatively low levels. It is also taken by artisanal and recreational hook-and-line and spearfishers in central Chile and the North Patagonian gulfs of Argentina (Venerus *et al*. 2016).

Threats

At this time, fishing activity is not expected to be driving global-level population declines approaching a Near Threatened or threatened level. Individuals of the non-native Chinook Salmon (*Oncorhynchus tschawytscha*) escaped from the aquaculture industry into waters of the straits of southern Chile in the mid-1980s and had become invasive throughout the area by 2005. In the fjords and Chilean part of the Patagonia Sea region, the transfer of disease from consumption of salmon food pellets may impact this species and juveniles could be consumed by the invasive salmon (Hüne *et al.* 2018, M. Hüne pers. comm. 2019).

Conservation

There are no species-specific conservation measures. There are no fishing regulations for this species in Argentina (C. Buratti pers. comm. 2020).

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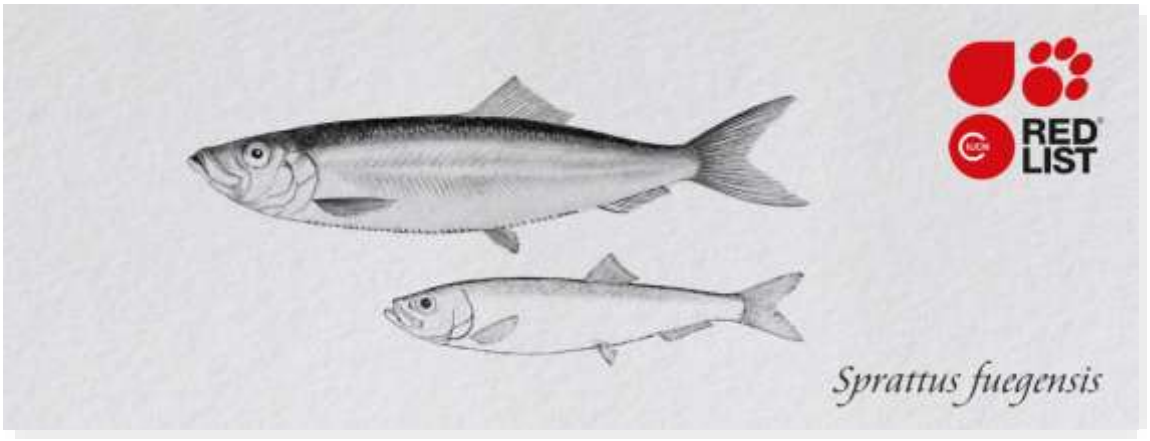


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This coastal, pelagic species is widely distributed in the southwestern Atlantic and southeastern Pacific. It is short-lived and has an estimated generation length of 3-4 years. It is targeted by commercial, artisanal fisheries in the northern part of its range in Chile. Total biomass has declined by about 40% over the past three generation lengths, or since 2006, in the Lakes Region of Chile, and that stock is considered overfished. It is not targeted elsewhere in its range at this time, including in the area that contains the largest proportion of its global population. Fishing activity is not expected to be driving global-level declines approaching a Near Threatened or threatened level at this time; therefore, it is listed as **Least Concern**. However, fishing effort may expand further south where it remains abundant, and this is a concern.

Assessor(s): Buratti, C., Díaz de Astarloa, J., Hüne, M., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

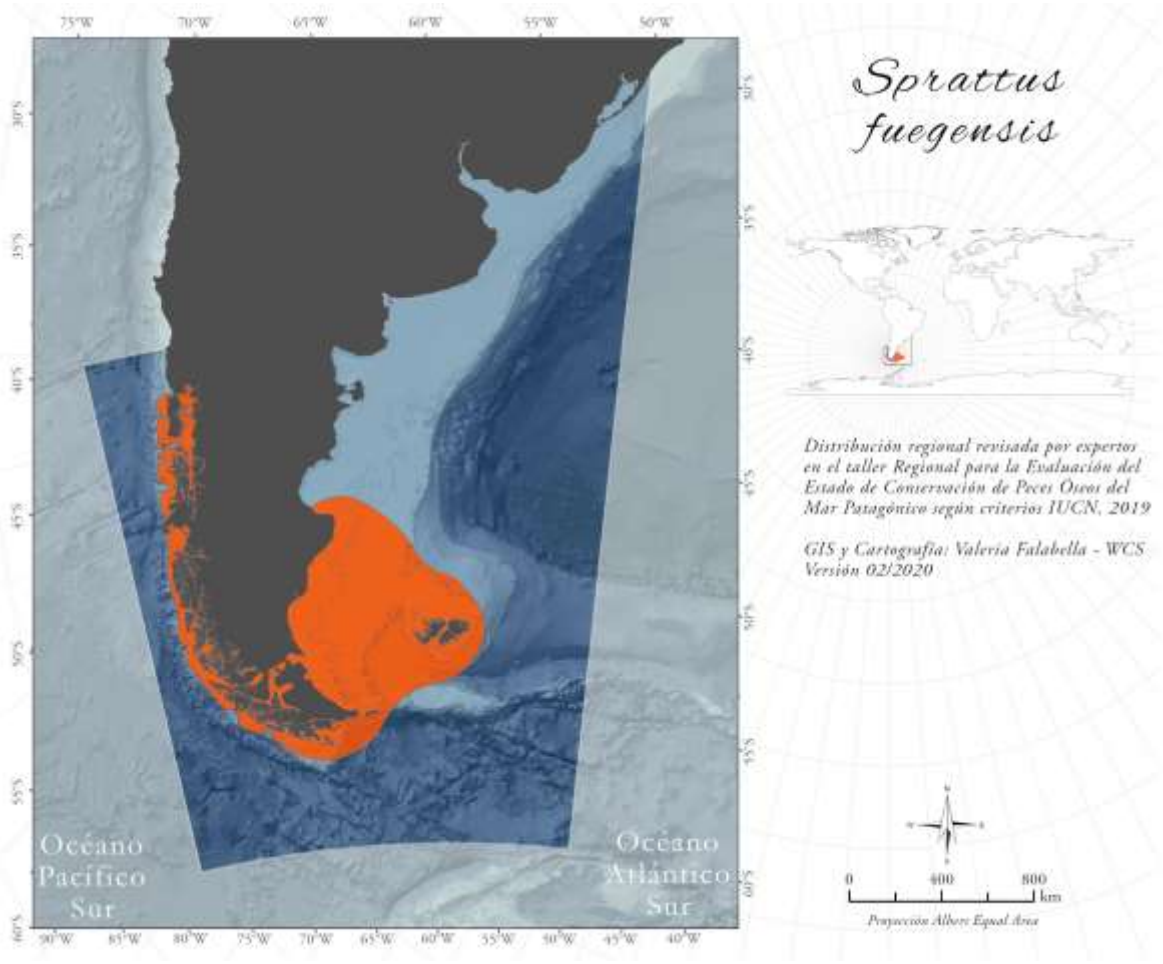
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - CLUPEIFORMES - CLUPEIDAE - Sprattus – fuegensis (Jenyns, 1842)

Common Names: Fuegian Sprat (English),Patagonian Sprat (English), Sardina Austral (Spanish; Castilian)

Geographic Range



This species is distributed in the southeastern Pacific off Chile north to Reloncaví Sound at 41°42'S south to Tierra del Fuego and into the southwest Atlantic north to the southern San Jorge Gulf, including the Malvinas Islands (Whitehead 1985, Aranis *et al.* 2007). The depth range is 0-50 meters (Whitehead 1985).

Population

This species is common throughout its range. No genetic structuring has been found between the Pacific and Atlantic, but they are treated as separate stocks (Canales-Aguirre *et al.* 2018, Casarsa *et al.* 2019).

In the Atlantic, it is most abundant south of San Jorge Gulf, especially in Tierra del Fuego and around the Malvinas Islands. One stock occurs in the Malvinas and the other occurs off the provinces of Santa Cruz and Tierra del Fuego, including the Fuegian channels (Hansen 1999, Casarsa *et al.* 2019). The Malvinas stock has larger fish and higher school densities as compared to the continental stock. Despite its high abundance, this species has never been fished on an industrial/commercial level in the Atlantic part of its range (Casarsa *et al.* 2019). It is possible a commercial fishery could develop in the future (Diez *et al.* 2018).

On the Pacific coast, it is more abundant in the southern part, especially the Strait of Magellan. On the genetic level, there is one stock in Chile, but on an ecological level, there are morphological differences that indicate there are two stocks. One is in the Chiloé inland sea (41º90'S-43º50'S) and the other inhabits the southernmost areas of Chile (Galleguillos *et al.* 2012). It is more abundant further south of the Lakes region and there appears to be some level of connectivity between the two stocks (Galleguillos *et al.* 2012, Leal and Zúñiga 2017). Stock assessments are conducted by IFOP for the inland waters of the Los Lagos Region, but not for the Magellan Region (southern area). There is an artisanal fishery that targets this species in the Los Lagos and Aysen Region, which is in the northern part of its range in Chile (Cubillos *et al.* 2015). It is not fished in the Magellan Strait region because the traditional fishery is located further north; however, as the population declines in the north, fishing effort has moved further south, and this is a concern.

Before 2006, species-specific fisheries data were not collected in part due to confusion with the common sardine (*Strangomera bentincki*). It was identified in the catch according to work by Aranis *et al.* (2007). In the pelagic purse-seine fishery of inland waters of Los Lagos (Chiloé), annual landings have been declining in recent years. Landings steeply declined between 2009 and 2010 and remained around 20,000 t from 2010 to 2017. Across the entire time period (2006-2017), catch per unit effort varied with no clear overall trend (Leal and Zúñiga 2017). In 2018, landings (9,500 t) declined by 56% compared to the previous year and recruitment was poor (IFOP 2020). According to a hydroacoustic survey, acoustic biomass in 2016 was 106,000 t and then declined to 66,800 t in 2017. Total biomass for the time period from 2006 to 2017 peaked in 2006 at 217,822 t and declined thereafter to a low of 94,018 t in 2011 and varied between 108,862 t to 143,742 t from 2012 to 2017, which represents about a 40% decline since 2006, or over the past three generation lengths. Spawning biomass also had a declining trend from 2006 to 2012. Recruitment strength has varied widely from year to year. Fishing mortality increased between 2006 to 2009 but declined in subsequent years when catch limits were implemented. According to the most recent stock assessment, it is overfished, and overfishing is occurring (Leal and Zúñiga 2017).

Habitats and Ecology

This pelagic species forms schools in coastal waters in both inshore and offshore areas. Juveniles utilize inshore areas to feed. The maximum standard length is 18 cm but is most commonly found to 15 cm (Whitehead 1985). A major nursery ground is located off the coast of Santa Cruz and Tierra del Fuego, Argentina. Spawning occurs from October to January off Argentina (Sanchez and Mabragana 2002). Spawning occurs in the inland sea area off Chiloé from September to December (Leal *et al.* 2011). A spawning and nursery area is located on the Burdwood Bank (Alonso *et al.* 2018). It is an important prey item of many large species in Patagonian waters (Montecinos *et al.* 2016, Diez *et al.* 2018). Natural mortality is estimated as 0.83-1.3 $year^{-1}$ and longevity is at least 6 years (Leal *et al.* 2011, Cerna *et al.* 2014, Leal and Zúñiga 2017). Age at first maturity is 2 years (Hansen 1999). When applying an age at first reproduction of 2 years and longevity of 6 years, its estimated generation length is 4 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction − age at first reproduction)/2. When applying an alternative equation recommended by the IUCN Red List methods: 1/adult mortality + age of first reproduction, the generation length is about 3 years.

General Use and Trade Information

This species is targeted by pelagic artisanal fisheries using small purse seines in the Chiloé region of Chile (Cerna *et al.* 2014).

Threats

Fishing activity is not expected to be driving global-level declines approaching a Near Threatened or threatened level at this time.

Conservation

An annual total allowable catch limit has been in place in Chile since 2008 and the Fisheries Development Institute of Chile (IFOP) has conducted annual stock assessments since 2010 and acoustic surveys of biomass since 2014 (Cerna *et al.* 2014, Leal and Zúñiga 2017). The Atlantic stocks are monitored via scientific surveys (Casarsa *et al.* 2019). It occurs in the marine protected area known as Bahia Tictoc in Corcovado Gulf, Chile (Ferrada-Fuentes *et al.* 2014) and the Namuncurá Marine Protected Area–Burdwood Bank located on the Argentinian shelf (Alonso *et al.* 2018).

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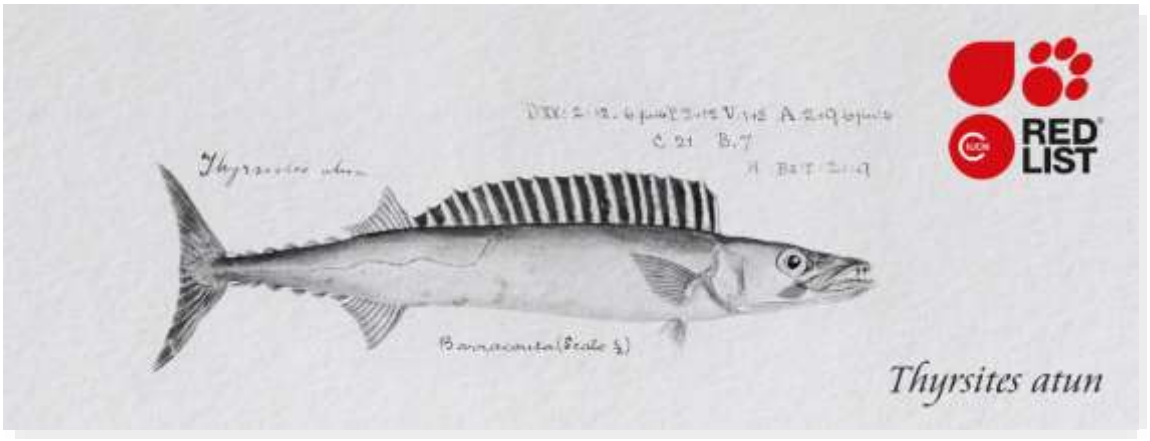


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This pelagic species is widely distributed in the Patagonia Sea region. Elsewhere, it is widespread in the Atlantic, Pacific and Indian oceans. It is targeted by commercial fisheries in the northern portion of its range in Chile, to a lesser extent in the southern portion and not at all in Argentina. Landings have increased significantly over the past decade, but population declines are not suspected at this time. There are no known major threats; therefore, it is listed as **Least Concern** in the Patagonia Sea.

Assessor(s): Hüne, M., Buratti, C., Díaz de Astarloa, J., Irigoyen, A., Landaeta, M., Riestra, C. & Vieira, J.P.

Reviewer(s): Linardich, C.

Contributor(s): Campagna, C.

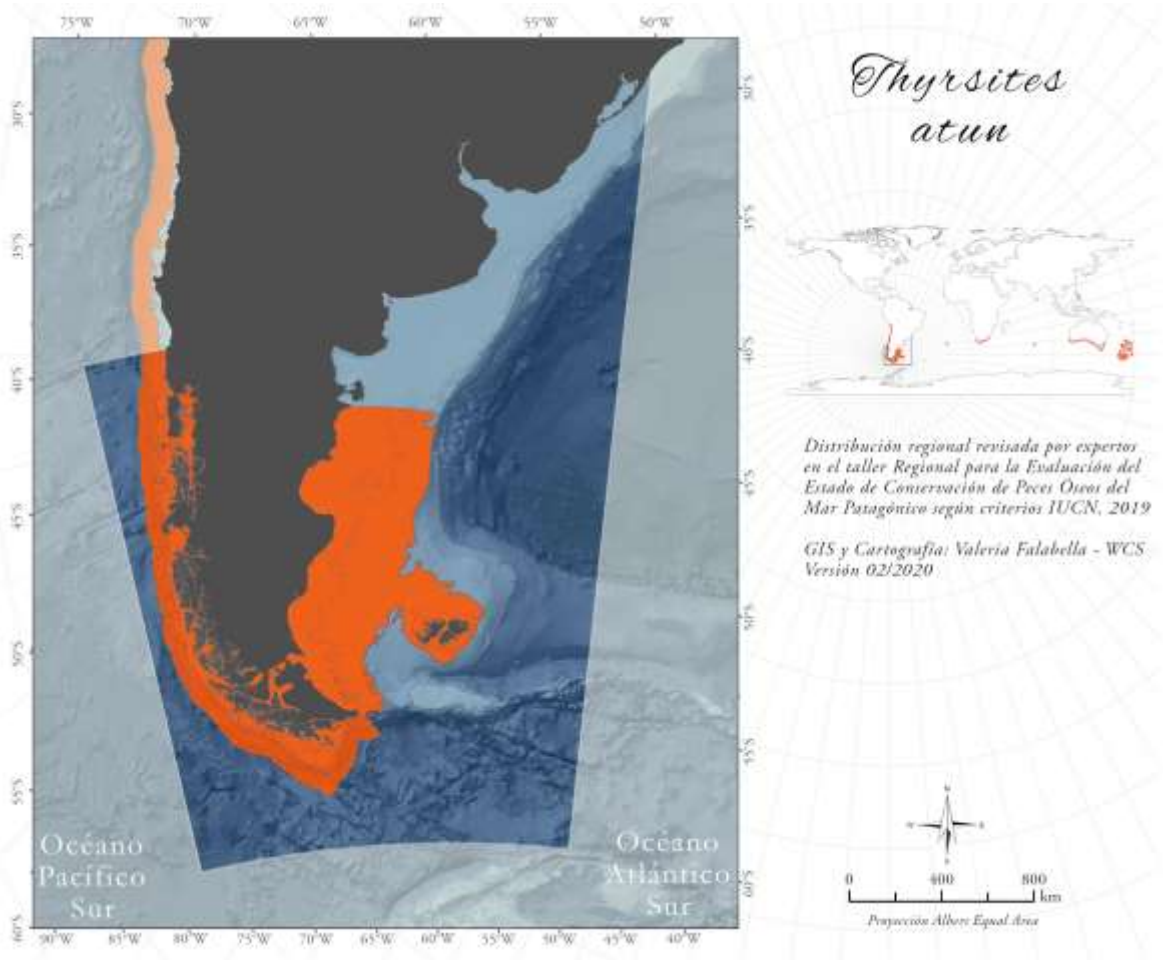
Facilitators/Compilers: Falabella, V., Linardich, C. & Wildlife Conservation Society

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PERCIFORMES - GEMPYLIDAE - Thyrsites – atun (Euphrasen, 1791)

Common Names: Snoek (English), Escolier (French), Sierra (Spanish; Castilian)

Geographic Range



In the Patagonia Sea region, this species is distributed throughout Chile to Tierra del Fuego and north to Chubut, Argentina, including the Malvinas. On the eastern Pacific coast, it extends northward to southern Peru. Globally, it occurs elsewhere in the Atlantic, Indian and Pacific oceans between 35° to 55°S latitude (Nakamura and Parin 1993). Its depth range is 0-550 metres (Kailola *et al.* 1993).

Population

In the Patagonia Sea region, this species can be relatively abundant on the shelf break in the northern portion of its Chilean range. Off Chile, there is just one population. It is targeted in northern Chile and landings increased over the past decade from 800 t in 2008 to 3,000 t in 2018. It is fished at a lower level in the southern portion due to its lower natural abundance there (M. Hüne pers. comm. 2019).

Habitats and Ecology

This pelagic species inhabits continental shelves and slopes or around islands. It prefers temperatures between 13° and 18°C. Schooling may occur when either close to the bottom or midwater, and occasionally at the surface at night. The maximum standard length is 150 cm (Nakamura and Parin 1993). It reaches sexual maturity at 60 cm (Bianchi *et al.* 1993). It consumes pelagic crustaceans, cephalopods and fishes such as anchovies, sardines, herrings, carangids, and mugilids (Blackburn 1957).

General Use and Trade Information

This species is bycatch of midwater trawlers and is occasionally caught in bottom trawls or longliners (Bianchi *et al.* 1999). In the Patagonia Sea region, it is targeted off Chile, but is not utilized in Argentina.

Threats

Fishing activity is not expected to be driving declines approaching a Near Threatened or threatened level at this time.

Conservation

There are no species-specific conservation measures.

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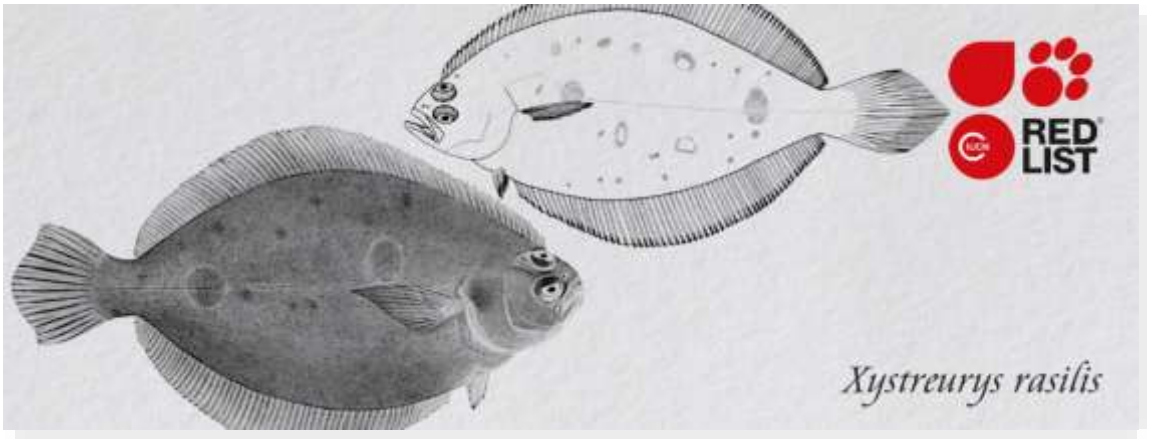


LC – Least Concern, (IUCN version 3.1)

Assessment Rationale:

This demersal species is distributed from southern Brazil to Argentina. It is taken in commercial fisheries in Uruguay and northern Argentina, which is where its largest global abundance exists. According to stock assessment and fisheries data, there is no decline detected in the demersal stock in Argentina and Uruguay and abundance indices show an increase in recent years (since 2014). Conservation measures in Argentina and Uruguay include a total allowable catch limit and regular monitoring of stock status. Fishing is not expected to be driving declines approaching a threatened or Near Threatened level at this time; therefore, it is listed as Least Concern.

Assessor(s): Riestra, C., Díaz de Astarloa, J.

Reviewer(s): C. Linardich

Facilitators/Compilers: C. Linardich & Fonseca, C.

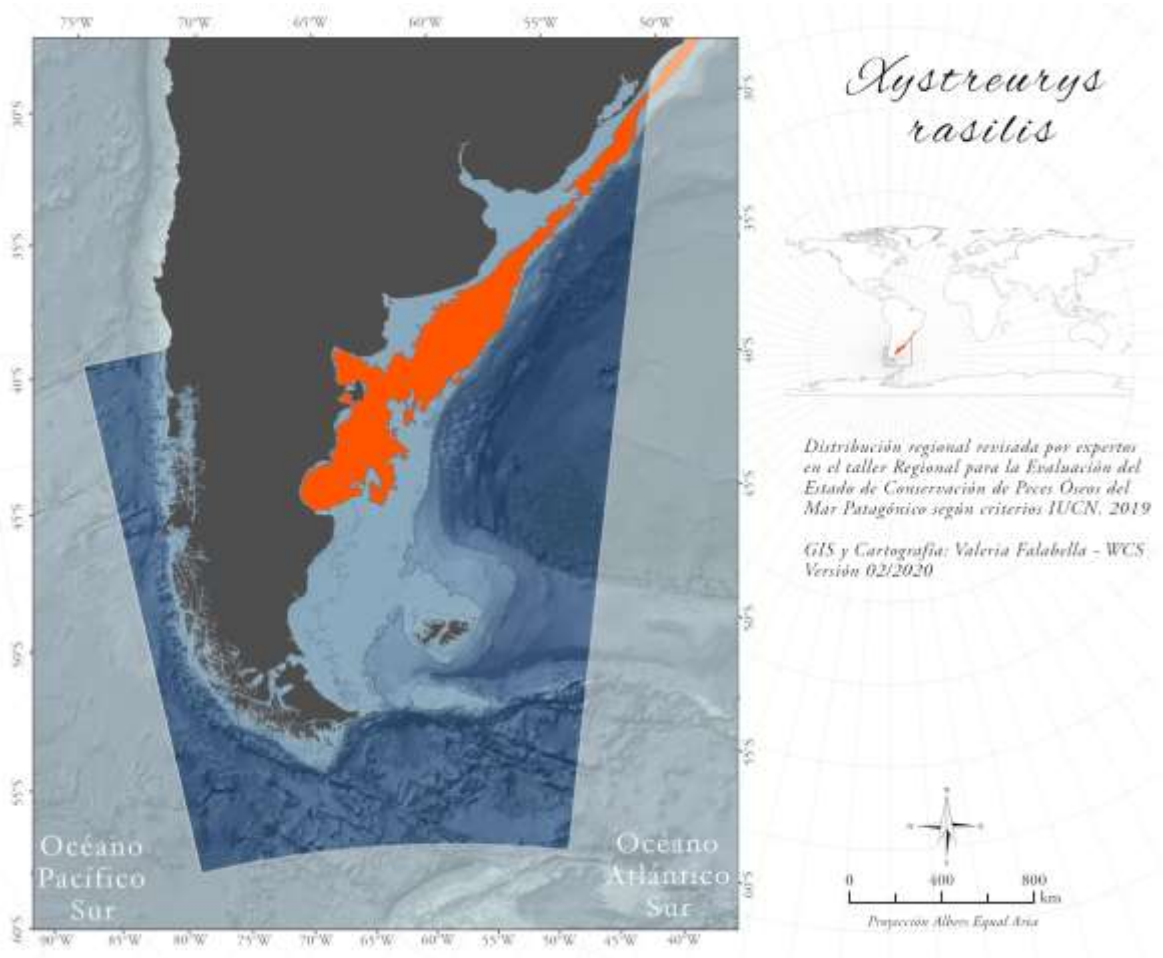
Institution(s): Oceanario de Lisboa

Taxonomic information

ANIMALIA - CHORDATA - ACTINOPTERYGII - PLEURONECTIFORMES - PARALICHTHYIDAE - Xystreurys – rasile (Jordan, 1891)

Common Names: No common Names

Geographic Range



This species is distributed in the southwestern Atlantic from Rio de Janeiro, Brazil to the San Jorge Gulf, Argentina. The depth range is 50-100 metres (Díaz de Astarloa 2002).

Population

This species is common and abundant in parts of its range (Díaz de Astarloa *et al.* 1999, Martínez-Muñoz 2001, Díaz de Astarloa 2002). It is scarcely caught in Brazil, where together with *Oncopterus darwinii*, it represents 0.3% of the total flatfish landings. It is very abundant in Buenos Aires Province and from 43º-45ºS, but further south, it is either absent or rare. It is captured throughout its range with the sympatric paralichthyids, *Paralichthys patagonicus, P. isosceles* and *P. orbignyanus*. This species is captured in very low numbers as compared to *P. patagonicus* and *P. orbignyanus* (Díaz de Astarloa 2002). The Argentine and Uruguayan Common Fishing Zone (Zona Común de Pesca Argentino-Uruguaya), which is where the fishery that targets flatfishes and other demersal fishes operates, includes Uruguay and northern Argentina, with the highest catch occurring off Buenos Aires and declining to the south. Flatfish species represent only 6% of this catch and some vessels changed the target species towards the south to target prawn, so effort declined in recent years. Catch per unit effort (CPUE) from 1999 to 2018 was very variable. Biomass estimates from 1934 to 2018 show somewhat of a decline, but this is highly uncertain as the indices of abundance trend upward since about 2014 or over the past 4-5 years. Data from recent research cruises are expected to improve these model indices. According to the most recent stock assessment of the demersal fishery, it is not overfished and overfishing is not occurring. A Total Allowable Catch (TAC) limit was implemented for this fishery in recent years, and actual total catch has not reached this limit (Rodriguez and Riestra 2019). The status of its population in Uruguay and Argentina is somewhat uncertain, but is not expected to have declined significantly, and is currently understood to be stable.

Habitats and Ecology

This demersal species occurs on mud and sand bottoms on the continental shelf, generally in areas of higher salinity and lower temperature (Martínez-Muñoz 2001, Díaz de Astarloa and Fabré 2003). The maximum total length is 40.2 cm, males reach sexual maturity at 20 cm and 1.3 years of age, and females at 21 cm and 2 years (Fabré *et al.* 2001, Díaz de Astarloa and Fabré 2003). This species grows rapidly and longevity is at least 12 years (Fabré and Cousseau 1988, Fabré 1992). In spring, mature individuals migrate to shallow waters to spawn, and return to deeper waters to feed in autumn (Fabré *et al.* 2001). When applying an age at first reproduction of 1-2 years and longevity of 12 years, its estimated generation length is 7 years based on the following equation recommended by the IUCN Red List methods: Age at first reproduction + (Age at last reproduction – age at first reproduction)/2.

General Use and Trade Information

This species is taken in recreational and commercial fisheries in northern Argentina and Uruguay (34º-41º S) (Díaz de Astarloa 2002, Díaz de Astarloa and Fabré 2003).

Threats

Fishing is not expected to be causing declines approaching a threatened or Near Threatened level at this time.

Conservation

In Argentina and Uruguay, fishing effort is regulated through total allowable catch limits, a closed-area off El Rincon during the spawning season (October to March) and regular stock assessments monitor its status there.

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