

**ENDANGERED SPECIES ACT
STATUS REVIEW OF THE BRAZILIAN GUITARFISH
(*Rhinobatos horkelii*)**



(costanorte.com.br)

Grace A. Casselberry¹ and John K. Carlson²



¹Contractor with Riverside Technology, Inc. in support of NOAA Fisheries Service, Southeast Fisheries Science Center

²NOAA Fisheries Service, Southeast Fisheries Science Center-Panama City Laboratory

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Executive Summary

This status review report was conducted in response to a petition received from WildEarth Guardians on July 8, 2013 to list 81 marine species as endangered or threatened under the Endangered Species Act (ESA). NMFS evaluated the petition to determine whether the petitioner provided substantial information that the petitioned action may be warranted, as required by the ESA. In a *Federal Register* notice on February 24, 2014 (79 FR 10104), NMFS determined that the petition did present substantial scientific and commercial information, or cited such information in other sources, that the petitioned action may be warranted for 10 species of skates and rays and 15 species of bony fishes, and thus NMFS initiated a status review of those species. This status review report considers the biology, distribution, and abundance of and threats to one guitarfish species from the Southwestern Atlantic, *Rhinobatos horkelii* (Brazilian guitarfish).

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INTRODUCTION

Scope and Intent of the Present Document

On July 8, 2013, the National Marine Fisheries Service (NMFS) received a petition from WildEarth Guardians to list 81 species of marine organisms as endangered or threatened species under the Endangered Species Act (ESA) and to designate critical habitat. NMFS evaluated the information in the petition to determine whether the petitioner provided “substantial information” indicating that the petitioned action may be warranted, as required by the ESA.

Under the ESA, if a petition is found to present substantial scientific or commercial information indicating that the petitioned action may be warranted, a status review shall be promptly commenced (16 U.S.C. §1533(b)(3)(A)). NMFS decided that the petition presented substantial scientific information indicating that listing may be warranted and that a status review was necessary for Brazilian guitarfish (*Rhinobatos horkelii*) (79 FR 10104). Experts and members of the public were requested to submit information to NMFS to assist in the status review process from February 24 through April 25, 2014.

The ESA stipulates that listing determinations should be made on the basis of the best scientific and commercial information available. This document is a compilation of the best available scientific and commercial information on the biology, distribution, and abundance of and threats to the Brazilian guitarfish, in response to the petition and 90-day finding. Where available, we provide literature citations to review articles that provide even more extensive citations for each topic. Data and information were reviewed through 30-May 2014.

LIFE HISTORY AND ECOLOGY

Taxonomy and Anatomy

The Brazilian guitarfish (*Rhinobatos horkelii*) is a member of the order Rajiformes and the family Rhinobatidae (Lessa and Vooren 2007). In Portuguese, it is called *viola* or *raia-viola* (Figueiredo 1977, Rosa and Lima 2005). In Spanish, it is called *pez guitarra*, *guitarra grande*, *mandolin*, and *melgacho* (NPOA-Argentina 2009). The Brazilian guitarfish has long nostrils with transversely flat or a slightly convex crown (Lessa and Vooren 2007). The interorbital distance is 3.7 times the preorbital distance. The spiracles have two distinct peaks with the outer peak nearly two times as large as the inner (Refi 1973). There are 56-68 teeth in the upper jaw and 62-74 teeth in the lower jaw, with teeth getting larger towards the center of both jaws (Bigelow and Schroeder 1953, Refi 1973). The disc width is about 5/6 of the body length (Bigelow and Schroeder 1953). The insertion of the first dorsal fin is behind the tips of the pelvic fins, and the median row of tubercles on the dorsal surface are large and thorn-like (Lessa and Vooren 2005). The dorsal midline has a row of tubercles with 62-73 in front of the first dorsal, 9-11 between the two dorsal fins, and 4-10 after the second dorsal (Refi 1973). The dorsal fins are triangular and similar in size with straight or slightly convex margins. Near the orbits, there are 4-7 larger tubercles and 2-6 along the inner margin of each orbit. The tip of the snout also has 2-4 small rounded tubercles on juvenile specimens (Bigelow and Schroeder 1953). The dorsal side is olive grey or chocolate brown and lacks light or dark markings. Additionally, the snout has a “sooty” oval patch (Lessa and Vooren 2005). The ventral side is a lighter version of the dorsal color or the same color as the dorsal side (Bigelow and Schroeder 1953).

The species within the family Rhinobatidae are very similar morphologically, which can make them difficult to distinguish from each other (De-Franco et al. 2010). *Rhinobatos horkelii* and *Rhinobatos percellens* are particularly similar and co-occur in Brazil (Lessa and Vooren 2005, De-Franco et al. 2010). Published records of *Rhinobatos percellens* in southern Brazil (Chao et al. 1982 in Lessa and Vooren 2007) are not accurate due to problems with one of the criteria originally used for separating *R. horkelii* and *R. percellens*. According to Figueiredo (1977), the Brazilian guitarfish's mouth is proportionally smaller than *R. percellens*. From measurements of only four specimens (two juveniles of *R. percellens* and two juveniles of *R. horkelii*, all from Rio de Janeiro), Bigelow and Schroeder (1953) used the relative size of the nasal groove as a diagnostic criterion for separating *R. horkelii* and *R. percellens*. However, according to Lessa and Vooren (2007), the value of this morphometric measurement does not permit the correct identification of specimens of all sizes and from all areas where they co-occur. Over 9,000 specimens of *Rhinobatos spp.* have been examined since 1972 from southern Brazil by Lessa (1982) and Sadowsky (1973) (reported in Lessa and Vooren (2007)) using the criterion of Bigelow and Schroeder (1953) and all were correctly identified as *R. horkelii*. Recently, a multiplex-PCR protocol has been developed to accurately distinguish between the two species (De-Franco et al. 2010; this technique is discussed further in the Adequacy of Regulatory Mechanisms section below).

Range and Habitat Use

The Brazilian guitarfish is distributed along the coast of South America in the southwestern Atlantic from Bahia, Brazil to Mar del Plata, Argentina (Figure 1; Figueiredo 1977,

Lessa and Vooren 2005, 2007, GBIF Database). The majority of the population is concentrated between 28° and 34°S. Newborns and juveniles live year round in coastal waters less than 20 m deep. Adults coexist with immature individuals in shallow waters between November and March, when pupping and mating occurs, but spend the rest of the year offshore in waters greater than 40 m depth. In the winter, individuals can be found in water temperatures as low as to 9°C, while the average summer water temperature individuals are found in is 26°C (Lessa and Vooren 2005). Brazilian guitarfish are commonly found in salinities ranging from 24-28 ppt in northern Argentina (Jaureguizar et al. 2006).



Figure 1. The range of the Brazilian guitarfish from Bahia, Brazil, to Mar del Plata, Argentina, based on information gathered in this review.

Diet and Feeding

Refi (1973) recorded the stomach contents of six individuals caught in Mar de la Plata, Argentina. Stomachs contained octopus, *Octopus tehuelchus*, shrimp, *Hymenopeneus muelleri*, decapods, isopods, and polychaetes.

Growth and Reproduction

Based on a yearly vertebral annulus formation in September, Lessa and Vooren (2005) found that the theoretical maximum size and growth rate based on the von Bertalanffy growth equation were 135.5 cm TL (L_{∞}) and 0.194 (K), respectively, with age at maturity is between 7 and 9 years for females and 5 and 6 years for males. Caltabellota (2014) found similar results with L_{∞} equal to 121.71 cm and K equal to 0.21. No significant differences were found in growth between the sexes. The Fabens theoretical longevity was estimated to be 18.24 years for females and 13.86 years for males, while the Taylor theoretical longevity was estimated to be 14.17 years for females and 10.90 years for males (Caltabellota 2014). Lessa and Vorren (2007)

estimated female longevity to be 28 years and male longevity to be 15 years. The Brazilian guitarfish can reach up to 1.5 m total length (TL) and weigh up to 12 kg (Martins and Schwingel 2003).

The size at maturity for Brazilian guitarfish is between 90 and 120 cm TL for both sexes (Lessa et al. 2005a, Lessa and Vooren 2005). The reproductive cycle is annual. Gravid females live at depths greater than 20 m for most of the year, but migrate into the shallows in the spring and summer to give birth. Females mate after giving birth (Vooren 1997, Lessa and Vooren 2005). The smallest pregnant females recorded were between 91-92 cm TL, and all captured females 119 cm TL and larger were pregnant. Gestation time is 11-12 months. Females have 4-12 pups/litter, and litter size increases with female size (Lessa and Vooren 2005). Development is lecithotrophic, and litter mass ranges between 5 and 7% of female body mass (Vooren 1997). Pregnancy has two phases. The dormant stage is from April to November, while females are in relatively deep, cold waters between 40 and 100 m (Lessa et al. 2005a). The fertilized eggs are enclosed in a common shell, and do not continue to develop until summer. Warm summer temperatures in November initiate the shell to open and embryo development progresses rapidly, with embryos growing from 1 cm to 29 cm TL (Lessa and Vooren 2005).

Demography

The Brazilian guitarfish gives birth to 4-12 pups annually. Females mature between 7 and 9 years of age (Lessa and Vooren 2005). However, Caltabellota (2014) assumed an age at maturity of 5 years, and found the estimated total natural mortality from catch curves to be 0.692 for males and 0.751 for females. Modeling of various exploitation scenarios found that under natural conditions with no fishing mortality, the population would increase by 9% each year, doubling every 7.41 years. In the presence of fishing mortality with an age at first capture of two years, the Brazilian guitarfish population will decline by 25% every 2.73 years, however if the age at first capture was after the age at first maturity, assumed to be 5 years for these models, the population would increase by 4% each year (Caltabellota 2014).

DISTRIBUTION AND ABUNDANCE

To provide a better understanding of the Brazilian guitarfish's current distribution and abundance, an extensive search of scientific publications, technical reports, fishery bulletins, and museum specimen records was conducted. We also searched the Global Biodiversity Information Facility Database for museum specimen records. However, there is question on the validity of some records and the website does not guarantee the accuracy of the biodiversity data. Thus, while we do provide a summary of these records the accuracy of the records is not completely reliable

The Brazilian guitarfish is found from Bahia, Brazil to Mar del Plata, Argentina, but most of the population is concentrated between 28° and 34°S in Brazil. Neonates and juveniles are present in shallow waters, less than 20 m, year round while adults migrate inshore from waters greater than 40 m to give birth and mate (Lessa and Vooren 2005). Brazilian guitarfish have been captured in the Río de la Plata estuary at depths between 12.6-16 m (Jaureguizar et al. 2003).

Few abundance estimates are available for the Brazilian guitarfish throughout its range. The mean biomass of Brazilian guitarfish in northern Argentina (34-43°S) was 0.1240 t/nm² between 1981 and 1999, making up 0.44% of the biomass of demersal fish on the northern

Argentine continental shelf (Jaureguizar et al. 2006). In northern Argentina, in 1981, Brazilian guitarfish biomass was calculated to be 0.010 t/nm². Biomass peaked in 1994 at 0.441 t/nm² before falling steadily to 0.007 t/nm² in 1999 (Jaureguizar et al. 2006). Biomass estimates from Argentina's FAO National Plan of Action for the Conservation of Chondrichthyans for the coast of Buenos Aires province and Uruguay were 2,597 t in 1994, 661 t in 1998, and 91 t in 1999 (NPOA-Argentina 2009). Research surveys conducted between Chuí and Solidão, Brazil in February 2005 found an average CPUE of 1.68 kg/hr, or 0.00168 t/hr, (Vooren et al. 2005) but this survey was only for one year.

Few records of Brazilian guitarfish were found in the literature review and in the GBIF Database (Table 1). Two records from the GBIF Database report individuals of Brazilian guitarfish in Peru and Trinidad. Both of these specimens come from old records and are housed in Natural History Museums in Denmark and Sweden. It is likely that these specimens were misidentified upon capture. As noted in the Taxonomy and Anatomy section of this report, it is difficult to distinguish between the different species of guitarfish that occur in the waters off of South America using solely morphological characteristics. The specimen from Trinidad may be *R. percellens*, a species commonly confused with the Brazilian guitarfish (Casper and Burgess 2009).

Table 1. Records of the Brazilian guitarfish based on an extensive search of scientific publications, technical reports, museum specimen records, and the Global Biodiversity Information Facility Database (GBIF).

Year	Total Number	Area	Country	Source
1700	1	Rio de Janeiro	Brazil	GBIF Database
1833	1	--	Peru	GBIF Database
1843	1	Bahia	Brazil	GBIF Database
1862	1	Rio de Janeiro	Brazil	GBIF Database
1866	1	Camamu	Brazil	GBIF Database
1867	1	Pernambuco	Brazil	GBIF Database
1918	1	--	Trinidad	GBIF Database
1966	1	Chuy	Brazil	GBIF Database
1978	1	Buenos Aires Province	Argentina	GBIF Database
1979	1	Lagoa das Patos, Rio Grande	Brazil	GBIF Database
1983	1	Rio Grande do Sul	Brazil	GBIF Database
2000	1	Barra do Rio Araranguí, Santa Catarina	Brazil	GBIF Database
2000s	18	Rio de Janeiro	Brazil	De-Franco et al. 2010
2000s	15	Sao Paulo	Brazil	De-Franco et al. 2010
2000s	7	Rio Grande do Sul	Brazil	De-Franco et al. 2010
2008-2009	149	Bahia to Rio Grande do Sul	Brazil	De-Franco et al. 2012
N/A	1	--	Brazil	GBIF Database
N/A	1	Pernambuco	Brazil	GBIF Database
N/A	1	Rio Grande do Sul	Brazil	GBIF Database
N/A	1	Tramandai	Brazil	GBIF Database
N/A	1	--	Brazil	GBIF Database

N/A	1	--	Brazil	GBIF Database
N/A	1	Rio Grande do Sul	Brazil	GBIF Database
N/A	1	Rio Grande do Sul	Brazil	GBIF Database
N/A	1	Bahia	Brazil	GBIF Database
N/A	1	Rio Grande do Sul	Brazil	GBIF Database
N/A	1	Rio Grande do Sul	Brazil	GBIF Database
N/A	1	Rio Grande do Sul	Brazil	GBIF Database
N/A	1	Torres, Rio Grande do Sul	Brazil	GBIF Database
N/A	1	--	Brazil	GBIF Database

ANALYSIS OF THE ESA SECTION 4(a)(1) FACTORS

NMFS is required to assess whether this candidate species is threatened or endangered because of one or a combination of the following five threats: (A) destruction, modification or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) inadequacy of existing regulatory mechanisms; or (E) other natural or human factors affecting its continued existence. Below we consider the best available information on each of the threat factors in turn.

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Trawl fisheries occur throughout the range of Brazilian guitarfish. Studies show that the interaction of bottom trawling gears with bottom substrate can have negative effects on benthic fish habitat. These impacts are often the most serious on hard substrates with organisms that grow up from the bottom such as corals and sponges, but alterations to soft substrates have also been seen (Valdemarsen et al. 2007). The trawl doors on bottom otter trawls often cause the most damage to the ocean bottom, but other parts of trawling gear, such as weights, sweeps, and bridles that contact the bottom can also be damaging. Intense fishing disturbance from trawling has reduced the abundance of several benthic species (Valdemarsen et al. 2007). Though there is no specific information available on how trawling has affected the Brazilian guitarfish's habitat, the existence of trawl fisheries within its range makes it likely that damage to bottom substrate has occurred.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Commercial Fishing

Some of the fisheries information provided in the following section refers to the genus *Rhinobatos*, not specifically to the Brazilian guitarfish, *R. horkelii*. Information about landings of *Rhinobatos spp.* within the Brazilian guitarfish's range will refer only to guitarfish while landings data specific to *R. horkelii* will specifically reference Brazilian guitarfish.

Commercial landings data for the Brazilian guitarfish could be inaccurate due to the common fishing practice of heading and gutting sharks and rays before they are brought into port. It has been noted that this makes identification of guitarfish to species particularly difficult (De-Franco et al. 2010). Genetic samples from guitarfish landed in 2008 and 2009 indicate that

the species composition of the catch was different from what was reported in the ports, as according to the genetic samples Brazilian guitarfish remained part of the catch even after landings were prohibited by Brazilian law (De-Franco et al. 2012; see Adequacy of Existing Regulatory Mechanisms for more details).

Before landings were prohibited, the Brazilian guitarfish was considered to be the only economically important species of the order Rajiformes in southern Brazil, where they were fished in industrial and artisanal fisheries (Lessa and Vooren 2005). Brazilian guitarfish were caught in otter trawls, pair trawls, shrimp trawls, beach seines, and bottom gillnets (Haimovici 1997, Mazzoleni and Schwingel 1999, Martins and Schwingel 2003). Commercial catches of the Brazilian guitarfish occurred from 28°-34°S in Brazil, where the species is most heavily concentrated (Martins and Schwingel 2003, Lessa and Vooren 2005). Catches of guitarfish were high between Imbituba and Rio Grande, Brazil from autumn to spring (Martins and Schwingel 2003). Over 70% of the Brazilian guitarfish were caught in paired trawls or the artisanal fishery. Catches from trawling peaked annually from December to March, when adults are concentrated in shallow waters for mating (Miranda and Vooren 2003).

Artisanal landings of Brazilian guitarfish came mainly from the beach seine fishery, which captured pregnant females and adult males on their inshore pupping migration (Miranda and Vooren 2003, Lessa and Vooren 2005). It has been reported that up to 98% of the artisanal fishery catch were pregnant females (Lessa and Vooren 2005). Miranda and Vooren (2003) reported artisanal landings declined from about 330 t in 1992 to 125 t in 1997.

Declines in total catch and catch-per-unit effort (CPUE) were seen in ports throughout southern Brazil (Figure 2, 3; Haimovici 1997, Haimovici et al. 1998). Landings of guitarfish in Rio Grande do Sul fell from 1,253 t in 1984 to 460 t in 1994, and CPUE declined from 0.76 t/trip in 1984 to 0.05 t/trip in 1992 (Martins and Schwingel 2003). The catch of Brazilian guitarfish in commercial elasmobranch fisheries in southern Brazil increased from 842 t in 1975 to 1,804 t in 1984 but then precipitously declined to 115 and 276 t between 1992 and 1997 (Miranda and Vooren 2003). In southern Brazil, CPUE declined from 1.46 t/trip in 1975 to 0.2 t/trip in 1993 for paired trawls, from 0.53 t/trip in 1975-1977 to 0.1 t/trip in 1988 for single trawls, and from 3.1 t/trip in 1996 to 0.22 t/trip in 1999 for the gillnet fishery (Miranda and Vooren 2003). These dramatic CPUE declines point to an estimated 85% decline in abundance from 1975-1990 (Miranda and Vooren 2003). Increases in CPUE have been recorded off Santa Catarina in paired trawls (0.11 t/trip in 2000 to 0.15 t/trip in 2002) and in single trawls (0.63 t/trip in 2001 to 1.0 t/trip in 2002). However, this increase is likely a reflection of changes in operational strategy as opposed to an increase in guitarfish abundance (Martins and Schwingel 2003). It is thought that high fishing pressure from both artisanal and industrial fisheries has caused stock biomass to decrease by about 90%, based on declines in annual CPUE from otter trawls and pair trawls and total landings in Rio Grande, Brazil (Lessa and Vooren 2005). Otter trawl CPUE declined from 0.76 t/trip in 1984 to 0.10 t/trip in 1997, and pair trawl CPUE declined from 2.03 t/trip in 1984 to 0.14 t/trip in 1997. Total landings from all fishery methods increased from 850 t in 1975 to 1,927 t in 1984 before falling to 216 t in 1997 (Lessa and Vooren 2005).

In July 2010, the state of São Paulo, Brazil, declared the stock of Brazilian guitarfish collapsed. This was due to intense exploitation that reduced biomass and reproductive potential to a level that severely compromised recovery (Act N° 56.031).

Little information is available on catches of Brazilian guitarfish outside of Brazil. In Uruguay, Brazilian guitarfish are caught as bycatch in bottom longline, oceanic gillnet, pelagic trawls, and bottom trawls (Domingo et al. 2008). From 1994 to 2001, Brazilian guitarfish were

caught exclusively in coastal fisheries, and the catch did not exceed 4 t/year (Paesch and Domingo 2003). No other information is available on landings data.

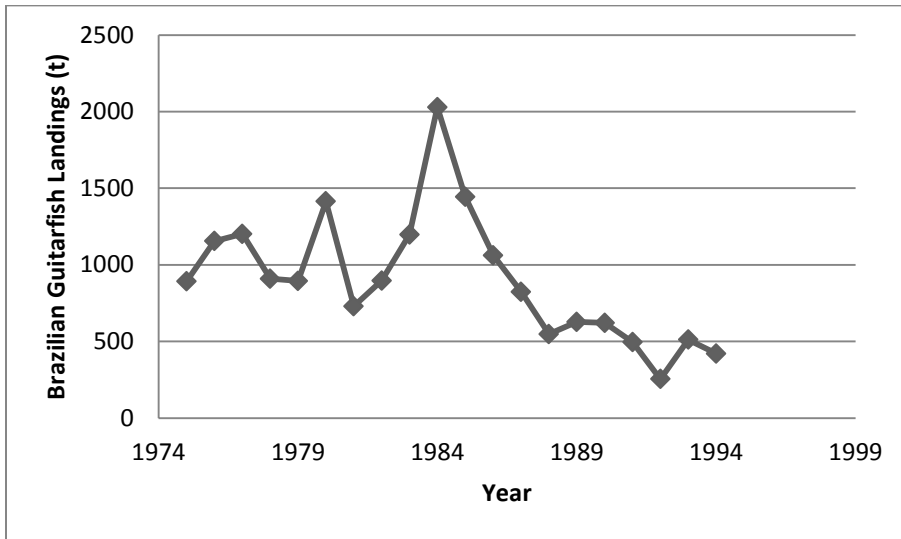


Figure 2. Landings of Brazilian guitarfish in tons from industrial fisheries in Santa Catarina, Rio Grande, and São Paulo, Brazil (Haimovici 1997).

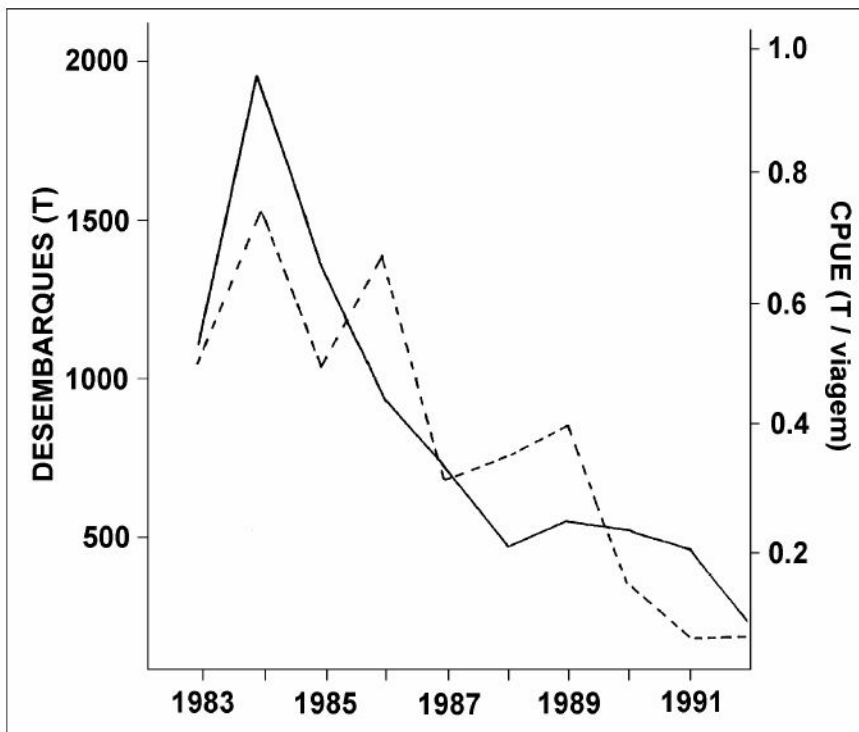


Figure 3. Landings of Brazilian guitarfish from the port of Rio Grande in tons (solid line) and the average annual CPUE from trawls in tons/trip (dashed line) (Haimovici et al. 1998).

Competition, Disease, or Predation

At this time no information is available about competition, disease, or predation that threatens the survival of the Brazilian guitarfish.

Adequacy of Existing Regulatory Mechanisms

In December 2014, the Brazilian guitarfish was listed in Annex 1 on Brazil's endangered species list as critically endangered (Brazilian Ministry of the Environment Directive N° 445). An Annex 1 listing prohibits the catch of the species except for scientific purposes, which requires a special license from the Brazilian Institute of Environment and Renewable Resources. Permits for directed fishing of the species are no longer issued, transport and sale of the species are prohibited, and incidental catches of the species must be discarded at sea. The Brazilian guitarfish was originally listed in Annex 1 in 2004 (Silva 2004). This original listing did not distinguish between endangered and critically endangered species, but carried with it the same fishing ban. According to Lessa and Vooren (2007), this law was gradually becoming more effectively enforced, but De-Franco et al.'s (2012) genetic studies indicate that by 2009 enforcement was still poor. There is also a prohibition of trawl fishing within three nautical miles from the coast of southern Brazil which is being enforced satisfactorily (Lessa and Vooren 2007). However, the species is still caught as bycatch in the legally permitted coastal gillnet fisheries and offshore trawl and gillnet fisheries (Lessa and Vooren 2007).

A genetic study of guitarfish landings in Brazil has found that although landings of Brazilian guitarfish are prohibited, they continue to be brought into ports throughout southeastern and southern Brazil. Of the 267 guitarfish samples collected between 2008 and 2009, 55.8% were identified as Brazilian guitarfish. Of the 85 samples from boats in Santa Catarina, 100% were Brazilian guitarfish, as opposed to *R. percellens* or *Zapteryx brevirostris*. Fishers commonly remove the head and gut any guitarfish before arriving in port, which makes it difficult to distinguish the Brazilian guitarfish from the other two species in the area, *R. percellens* and *Zapteryx brevirostris*. Surveys of fishermen indicate that they are aware of the Brazilian guitarfish capture prohibition, but it was concluded that lack of adequate government inspections may be encouraging them to disregard the law (De-Franco et al. 2012).

Brazilian guitarfish are found in several marine protected areas in Brazil. In São Paulo, they are found in APA de Cananéia-Iguape-Peruíbe, which is 234,000 hectares. In Parana, they are in PARNA do Superagui, which is 33,988 hectares, and in Santa Catarina, they are in REBIO do Arvoredo and RESEX Marinha do Pirjubaé, which are 17,600 and 1,712 hectares, respectively (Rosa and Lima 2005).

In December, 2014, the Brazilian Government's Chico Mendes Institute for Biodiversity Conservation approved the National Plan of Action for the Conservation of Elasmobranchs of Brazil (N° 125). The plan considers the Brazilian guitarfish to be one of the country's 12 species of concern and recommends a moratorium on fishing with the prohibition of sales until there is scientific evidence in support of recovery (N° 125, Lessa et al. 2005b). Additionally it proposes a fishing exclusion area over a large region of the coast of Rio Grande do Sul at depths of 20m to protect nursery areas. In general the plan sets short term goals for improved data collection on landings and discards, improved compliance and monitoring by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), supervision of elasmobranch landings to ensure fins are landed with carcasses, the creation of a national port sampler

program, and intensified on board observer monitoring programs. Mid-term goals include increased monitoring and enforcement within protected areas as well as the creation of new protected areas based on essential fish habitat for the 12 species of concern. They also call for improved monitoring of fishing from beaches in coastal and estuarine environments. Long term goals call for improved ecological data and stock assessments for key species as well as mapping of elasmobranch spatiotemporal distributions. This data will be used to better inform the creation of protected areas and seasonal fishing closures.

Uruguay's FAO National Plan of Action for the conservation of chondrichthyans lists the Brazilian guitarfish as a species of high priority (Domingo et al. 2008). It sets short-term goals of 12-18 months to investigate distribution and habitat use and generate time series of effort and catch, mid-term goals of 24-30 months to conduct an abundance assessment and determine maximum sustainable catch limits, and a long term goal of 36-48 months to conduct age, growth, reproduction, and diet studies. Uruguay made it a priority to review current fishing licenses that allow for the catch of Brazilian guitarfish and possibly modify them, grant no new fishing licenses, forbid processing and marketing, and promote safe release if possible. No updated results from the goals and priorities of this plan could be found. Argentina's FAO National Plan of Action for the conservation of chondrichthyans does not consider the Brazilian guitarfish to be a species of high priority (NPOA-Argentina 2009).

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