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Sotalia fluviatilis, Tucuxi

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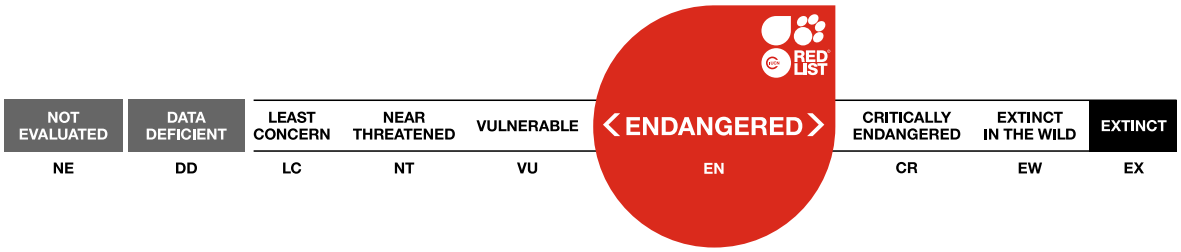

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Cetartiodactyla	Delphinidae

Scientific Name: *Sotalia fluviatilis* (Gervais & Deville in Gervais, 1853)

Synonym(s):

- *Delphinus fluviatilis* Gervais & Deville in Gervais, 1853
- *Delphinus guianensis* (Van Beneden, 1864)
- *Steno tucuxi* Gray, 1856

Common Name(s):

- English: Tucuxi
- French: Dauphin de l'Amazon, Sotalie
- Spanish; Castilian: Bufeo Negro, Bufo Negro, Delfín Gris de Rio

Taxonomic Source(s):

Committee on Taxonomy. 2017. List of marine mammal species and subspecies. Available at: www.marinemammalscience.org. (Accessed: 31 August 2018).

Taxonomic Notes:

Until relatively recently the genus *Sotalia* was considered monotypic with two ecotypes, one riverine and one marine (da Silva and Best 1996). However, genetic (Cunha *et al.* 2005, Caballero *et al.* 2007) and morphological (Monteiro-Filho *et al.* 2002, Fettuccia *et al.* 2009) studies have shown that the two ecotypes are separate species: *S. fluviatilis* in the Amazon River basin and *S. guianensis* in marine and estuarine waters of eastern South and Central America (da Silva and Best 1996, da Silva *et al*. 2010).

The *Sotalia* dolphins recorded at Ciudad Bolívar, some 300 km upstream of the mouth of the Orinoco River, were confirmed by molecular genetics to be an isolated and probably independent population of *S. guianensis* occurring as far as 550 km upriver in the Orinoco (Caballero *et al*. 2017).

Although the taxonomic status of *Sotalia* dolphins in the southern freshwater portion of Maracaibo Lake (in Venezuela near the border with Colombia) is not yet fully established, there is no connection between Maracaibo Lake and the present-day known range of *Sotalia fluviatilis*. Maracaibo Lake has been isolated from the Amazon basin for the last 8-10 million years (Hoorn *et al*. 1995, Días de Gamero 1996 quoted in Cunha *et al*. 2010). Thus, the likelihood that *Sotalia* dolphins from Maracaibo Lake are of the same species that occurs in the Amazon basin is remote. The dolphins in Maracaibo Lake are included in the assessment of *S. guianensis* (Secchi *et al*. 2018).

Assessment Information

Red List Category & Criteria: Endangered A4b ver 3.1

Year Published: 2020

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Justification:

The Tucuxi (*Sotalia fluviatilis*) was assessed on the IUCN Red List as "Data Deficient" in 2010 because the information available on threats, ecology, population numbers and trends was "limited" (Secchi 2012). However, improved information is now available on several of these aspects and it is clear that the species qualifies for a threatened category. It has long been recognized that Tucuxis die from entanglement ('bycatch') in fishing gear over much of their range and that their habitat in many areas has been modified and degraded by various human activities in addition to fishing (dam construction, mining, ship traffic, oil exploitation, etc.).

There are no estimates of historical or current population size for the Tucuxi. Surveys of parts of the species' range suggest that it is relatively common. However, in a closely monitored area of about 30 km^2 within the 11,240 km^2 Mamirauá Reserve (Brazil), for which long-term (1994-2017) standardized data are available, abundance has declined at 7.4% per year or by about 80% over the study period. Projecting this rate of decline for a 3-generation period (where generation length is 15.6 years from Taylor *et al.* 2007) from the start of the surveys (i.e. from 1994 to 2041) predicts a population reduction of 97%. If the decline rate estimated for that small part of the central Amazon region (Mamirauá area) were representative of the entire range of *Tucuxis*, and if declines were to persist, the species would qualify for Critically Endangered.

The spatial extent and intensity of the threats (fishing, deforestation, construction of hydroelectric plants and pollution) appear likely to continue increasing into the foreseeable future. Although the Mamirauá study area comprises a very small portion of the species' geographical range, the primary cause of the decline in this area (mortality due to human fishing practices) is present throughout most or all of the Tucuxi's range, which makes CR a plausible threat category under A4b (a range-wide population reduction of ≥ 80% over three generations (1994-2041) where the causes of the reduction have not ceased, combining the past observed and the future projected declines). However, given the uncertainty about the magnitude of threats or of information on trends in abundance throughout the extensive and varied range of this species, a lesser decline is also plausible. An overall decline of at least 50% in the total range-wide population over the 47-year (3-generation) period beginning around 2000 is also plausible. Therefore, the Tucuxi is listed as Endangered under criterion A4b (a range-wide population reduction of ≥50% over three generations (1994-2041) where the causes of the reduction have not ceased, combining the past observed and the future projected declines). It is emphasized that listing as either CR or EN is plausible, but EN was chosen on the assumption that threat levels differ substantially across the range of the species and observed densities also vary greatly across the range, suggesting the existence of demographically independent subpopulations. An in-depth investigation of the evidence for such subpopulations and a detailed threat assessment are strongly encouraged.

Previously Published Red List Assessments

2012 – Data Deficient (DD)
https://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T190871A17583369.en

2010 – Data Deficient (DD)

Geographic Range

Range Description:

Tucuxis are found in the Amazon drainage as far inland as southern Peru, eastern Ecuador and southeastern Colombia. They occur in the main tributaries of the Amazon/Solimões River basin, and they cross international boundaries in areas such as Leticia and Iquitos, between Brazil, Colombia, and Peru. The species does not occur in the Beni/Mamoré river basin in Bolivia; nor does it occur in the upper Rio Negro or the Orinoco river basin (da Silva and Best 1996, Caballero *et al*. 2010a, Caballero *et al*. 2010b, da Silva *et al*. 2010, Gómez-Salazar *et al*. 2012, McGuire 2010).

The main distributional barriers for tucuxis are waterfalls, rapids and shallow waters (da Silva and Best 1996, da Silva *et al*. 2010). In Brazil, there are no records of the species above the Santo Antônio and Teotônio falls, which are located just above Porto Velho on the Madeira river, nor are there any records from above the falls approximately 200 km from the mouth of the Tapajós River. Tucuxis do not occur above the Belo Monte rapids, which are located below Altamira on the Xingú River, nor do they occur in the Tocantins-Araguaia River basin. The Tocantins river has been cut off from its estuary by the Tucuruí Dam since 1988, although the rapids that were flooded by the reservoir had probably served as a barrier even before the dam's construction. On the Rio Negro there is a series of rapids beginning at Tapuruquara, about 900 m upstream, while the first major barrier is located 1200 km upstream. There are no records of Tucuxis above the falls of the Trombetas River, the first major one of which is Cachoeira Porteira, which is located about 260 km from the river mouth (da Silva *et al*. 2010).

In Colombia, Tucuxis do not occur upstream of the Cordoba rapids or upstream of the Estrella and Puerco rapids in the Apaporis river (Caballero *et al*. 2010a, 2010b). In the Peruvian Amazon, Tucuxis are seen mainly where the rivers are relatively wide and deep and where the current is low (Leatherwood *et al*. 2000, McGuire 2010). In Ecuador, Tucuxis have been reported in the lacustrine system of the Cuyabeno river (Laguna Grande), at Zancudo and at the mouth of the rivers Cuyabeno and Lagartococha on the Aguarico river, and at the Tiputini river, at lake Jatuncocha and at the Rio Pastaza basin (Zapata-Rios and Utreras 2004).

Tucuxis may move into smaller tributaries during the high-water season, but they do not move into the flooded forest, staying mainly in the main river channels, tributaries and lakes (da Silva and Best 1996, Vidal *et al*. 1997, Martin and da Silva 2004). Tucuxis are largely sympatric with Botos (*Inia geoffrensis*) in Amazon River systems (da Silva and Best 1996, Leatherwood *et al*. 2000, Martin *et al*. 2004).

Country Occurrence:

Native, Extant (resident): Brazil; Colombia; Ecuador; Peru

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Distribution Map

Legend

EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2020

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

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Population

The available data suggest that *Sotalia fluviatilis* has moderate to high genetic diversity, since 12 individuals from the same location in the central Brazilian Amazon had five different control region haplotypes (Cunha *et al.* 2005), and 21 dolphins from the Peruvian, Colombian and Brazilian Amazon had 13 haplotypes (combining the control region and ND2; Caballero *et al.* 2007). Based on 26 samples from 11 locations in three Amazonian regions (Brazil n=4, Colombia n=4, Peru n=3), Caballero *et al*. (2010a) found connectivity among the sampled regions and identified divergent haplotypes in the extremes of the species distribution. The same authors also found that compared to the Boto, Tucuxis showed high mitochondrial diversity overall, suggesting a surprisingly large effective population size and relatively high female gene flow throughout the sampled regions of the main river and its tributaries.

There are no estimates of total population size for the Tucuxi range-wide, though the species appears to have been relatively abundant throughout most of its range at one time, and may still be in some areas (da Silva and Best 1996, Leatherwood *et al*. 2000, Gómez-Salazar *et al*. 2012a, Flores *et al*. 2017). Density estimates for some relatively small areas have been published, though many of those estimates may be out of date if population declines mirror those in and around Mamirauá (see below). In the Amazon drainage, an average density (encounter rate) of approximately 1.1 dolphins/km of river was estimated between Manaus and Tefé in the Solimões River in 1979 (Magnusson *et al*. 1980). Four boat surveys of about 1,525 km each, from Manaus to Leticia, resulted in a mean estimate of 768 (± 104.7 SD) dolphins per survey or 1.02 individuals/km² in 1983-84 (da Silva and Best 1994, da Silva *et al*. 1984). Mean density along the margins of main rivers in the central Amazon, Brazil (1,320 km of strip survey) was estimated at 3.2 individuals/km² between 1999 and 2001. About 54% of the individuals were found within 50 m of the edge of rivers and channels (Martin *et al*. 2004). Coimbra *et al*. (2015), using mark and recapture analysis in a 13.5 km² area at the junction of the Solimões and Japurá rivers and the Mamirauá Lake system, estimated an abundance of 119 Tucuxis in the studied area from March to June 2013 (95% confidence interval = 105-150).

About 350 Tucuxis were sighted in the Amazon-Marañon rivers and 469 in the Samiria-Yanayacu Grande river system in Peru between July 1991 and August 1993 (Leatherwood 1996). Encounter rates in this area were within the range for these dolphins elsewhere in South America and it is thought that populations were stable over the period between 1991 and 2000 (McGuire 2002). Mean encounter rates in the Peruvian Amazon were 0.01-0.8 individuals/km in rivers and 0.05-2.17 individuals/km² in lakes (28 surveys over a four-year time period; McGuire 2002). The species was reportedly common in Colombia in the Loretoyacu River, in the Tarapoto and El Correo Lake system, from March to December 1993 (Vidal 1993). Vidal *et al*. (1997) estimated that in 1993 there were 409 Tucuxis (coefficient of variation = 13%) along 120 km of the Amazon River bordering Colombia, Peru, and Brazil. Density was highest in lakes (8.6 dolphins/km²), followed by areas along main banks (2.8) and around islands (2.0). Along 2,704 km of rivers in Colombia, Brazil, Ecuador, Peru, and Venezuela, Gómez-Salazar *et al*. (2012a) estimated 764 Tucuxis between May 2006 and August 2007 and also found densities highest in lakes. The only data available for the Rio Negro (Brazil) come from two surveys between Novo Airão and Manaus, conducted during April and October 2016, during flooding and receding water periods respectively (582 km and 410 km each) in which 333 and 244 Tucuxis were sighted with the most common group size of 2 individuals (Valle 2017). Unreplicable estimates of abundance or density in relatively small parts of the species' range, especially when they include earlier work, are of limited use for assessing trend. Numbers of Tucuxis in a stretch of river can vary markedly from day to day, as well as

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from season to season.

A survey conducted in the Tapajós River (Brazil) in 2014 covered 577 linear km and estimated that the abundance of Tucuxis (3.372 ind., CV = 0.38) was twice that for Botos (1,815 ind., CV = 0.4). A boat-based survey in the Tefé river and lake (Brazil) in December 2013 that covered 670 linear km estimated 511 individuals (CV = 0.26). The highest density of Tucuxis was in the confluences (9.03 ind km–1, SD = 1.29), followed by the lake-margin habitat (3.77 ind km–1, SD = 1.71) (Pavanato *et al*. 2019).

The only area for which a robust analysis of population trend over a relatively long period is available is within the 11,240 km^2 Mamirauá Reserve in Brazil, which is adjacent to the Amazon mainstem. Based on 363 standardized surveys of a 30 km transect conducted at regular intervals across all seasons from November 1994 to January 2017, and taking cyclical water-level changes into account, the Tucuxi population in that area was estimated to have declined by 7.4% per year over the study period, representing a halving of the number counted every 9.04 years (da Silva *et al.* 2018). The generation time of the Tucuxi is estimated as 15.6 years (Taylor *et al*. 2007), and projecting the decline forward for a three-generation period including the surveyed years (1994-2041) predicts a population reduction in this study area of 97%.

Because the magnitude of threats may differ among tributaries, extrapolation from these small study areas should be undertaken with caution. On the other hand, it is unrealistic to expect that studies of trends throughout the range, which are needed for species-level assessment under Criterion A, will be completed in a timely manner. Therefore, improved methods of making inferences, e.g. based on evaluating threat magnitude, are needed, even if it means heavy reliance on expert opinion.

Current Population Trend: Decreasing

Habitat and Ecology **(see Appendix for additional information)**

The biology and ecology of the Tucuxi are strongly related to seasonal variation in water levels (Martin and da Silva 2004, Martin *et al.* 2004, Gómez-Salazar *et al.* 2010, Gómez-Salazar *et al.* 2012b). Tucuxis inhabit all three types of water of the Amazon basin: white water, clear water, and black water. Therefore, physical factors such as visibility and acidity appear not to affect their distribution directly (da Silva and Best, 1996, Leatherwood *et al*. 2000). They seem to prefer the main channels of rivers and larger lakes where access is not limited by narrow or shallow channels, while rapids and fast-moving turbulent water are avoided. Generally, Tucuxis do not enter flooded forest. They are mostly found within 50 m of the edges of rivers and channels (Martin *et al.* 2004). Like the sympatric Boto, the Tucuxi shows a distinct preference for junctions of rivers and channels (da Silva and Best 1996, Leatherwood *et al.* 2000, McGuire 2002, Martin *et al.* 2004, Faustino and da Silva 2006, Gómez-Salazar *et al*. 2010, Gómez-Salazar *et al*. 2012b). The most preferred habitat is where a sediment-rich whitewater channel meets black water of low acidity. The resultant mixing produces highly productive and obviously attractive conditions for dolphins (Martin *et al.* 2004). The large seasonal fluctuation in river levels (10-16 m) influences the distribution of Tucuxis. They enter lake systems during periods of high water but leave these environments as the waters recede, thus avoiding entrapment (da Silva and Best 1994, Martin and da Silva 2004, Faustino and da Silva 2006, Coimbra *et al*. 2015). In the Peruvian Amazon, Tucuxis were not found in waters <3m depth in rivers or <1.8 m depth in lakes (McGuire 2002, Leatherwood 1996).

Home ranges and movements of Tucuxis are not known, but individuals may occur in the same area year-round. Two tagged individuals in the Amazon were found within 5 km of the tagging site up to one year later (da Silva and Best 1994). In the Mamirauá area in Brazil, 20 individuals carrying artificial marks were periodically resighted, with one adult male seen in the same locale over a period of nine years (Projeto Boto, unpublished data).

A long-term photo-identification study revealed a maximum known range for individuals of 130 km in Peru's Pacaya-Samiria Reserve (McGuire and Henningsen 2007). According to McGuire (2002), encounter rates were highest in confluences, intermediate in lakes, and lowest in rivers and did not differ among seasons in the latter two. During the dry season, Tucuxis persisted longer in the confluences and occurred in higher densities than in any rainy or intermediate season; the reverse pattern was observed during high water.

Tucuxis occur most often in groups of one to six individuals. Groups of more than nine are rarely observed (da Silva and Best 1994, Martin *et al*. 2004, Faustino and da Silva 2006, Coimbra *et al*. 2015, Valle 2017). Vidal *et al.* (1997) reported overall mean group size of 3.9 in the upper Amazon and Martin *et al*. (2004) a mean of 2.2 in the central Amazon. Tucuxis were most frequently seen as singles or pairs in rivers and lakes of Peru's Pacaya-Samiria Reserve; seasonal differences in group size were non-significant (McGuire 2002). Surveys in rivers in Colombia, Peru and Ecuador found a large variation in group size, from 1 to 26 individuals, and that group size varied with habitat type, the largest group size being found in confluences (Gómez-Salazar *et al*. 2012). Group size also varies according to the water level. The composition of groups, however, is unknown.

At least 28 species of mostly small schooling fishes belonging to 11 families are preyed upon by Tucuxis in the Amazon region. The characid family Curimatidae was represented in 52%, Sciaenidae in 39%, and siluriforms in 54% of stomachs analysed (n = 29) (da Silva 1983, da Silva and Best 1994, 1996). During the dry season, fish concentrate in the main water bodies and thus become more vulnerable to predation. During the flood season, many Tucuxi prey species enter the floodplain, making them largely out of reach of Tucuxis (da Silva and Best 1994, 1996).

Systems: Freshwater (=Inland waters)

Use and Trade

The Tucuxi is directly hunted for fish bait in the lower Japurá river, on the border of the Amana and Mamirauá Sustainable Development Reserves (Iriarte and Marmontel 2013b). In one year (2005), 12 Tucuxi carcasses were found in the Amana Reserve and Tefé Lake (Brazil), showing anthropogenic wounds (Loch *et al.* 2009). Current use for human food is not known to occur, but Leatherwood and Reeves (1997) reported that Tucuxis were directly exploited for human consumption and handicrafts by the Mura, Cocama, and Ticuna people until the first half of the 19th century

Threats (see Appendix for additional information)

Threats to Tucuxis are largely the same as those described for the sympatric Boto (da Silva *et al*. 2018), considering that the two species are sympatric in much of their range. These include incidental mortality in fishing gear, deliberate killing for fish bait, damming of rivers, and environmental pollution from organochlorines and heavy metals (Best and da Silva 1989, IWC 2007, Trujillo *et al.* 2010b).

There are no records of past or recent commercial hunting of *Sotalia* spp. A major threat to riverine dolphins, including the Tucuxi throughout its range, is incidental drowning in monofilament fishing nets (IWC 2001). However, incidental mortality has not been quantified anywhere in the range of the species, and the available data are inadequate to evaluate the impact of fisheries in most areas. Tucuxis aggregate in river confluences and other areas where fish abundance is high and fishermen concentrate their fishing effort (da Silva, unpubl. data). Tucuxis are vulnerable to entanglement in a variety of net types (e.g. lampara seine nets, fixed gill nets, drifting gill nets; da Silva 1983, da Silva and Best 1996, Martin *et al*. 2004). Carcasses of Tucuxis with evidence of entanglement have been observed and reported in the Japurá and Amazon rivers (Loch *et al.* 2009, Trujillo *et al.* 2010b, Iriarte and Marmontel 2013b) and in Coari Lake, Brazil (da Silva and Mello unpubl. data). The proportion of carcasses reported or recorded compared to the number that actually die is likely to be small. Most would be eaten by scavengers, disposed of by fishers, or washed away by the current.

The prey of Tucuxis includes at least 14 of the 30 species of commercially exploited fish in the Amazon, and thus incidental captures during fishing are frequent (da Silva and Best 1994, 1996, Martin *et al*. 2004). In one study in the central Amazon of Brazil, 74% of 34 Tucuxis examined had been killed in gill nets and 15% in seine nets (da Silva and Best 1996).

The practice of hunting Botos for fish bait, which appears to have begun in Brazil around the year 2000, and since expanded to other regions, reportedly also targets Tucuxis. Although Botos are the main target, there is evidence Tucuxis are also used as bait around Amana and Mamirauá Sustainable Development Reserves in the Central Brazilian Amazon (Iriarte and Marmontel 2013a,b). Despite a ban on commercial Piracatinga (*Calophysus macropterus)* fishing introduced by the Brazilian government in 2015, there is evidence that this activity continues to kill dolphins for bait in areas where Piracatinga are common (da Silva and Martin 2017, da Silva *et al*. 2018).

Fishing with explosives, although illegal in most countries, has been common in some areas of the Amazon basin (Goulding 1983, Smith 1985) and threatens Botos and Tucuxis due to concussive effects. Fishermen also reportedly attempt to kill dolphins that are attracted to the explosive fishing operations to prey on stunned or dead fish (Best and da Silva 1989, Utreras *et al.* 2001, Zapata-Ríos and Utreras 2004). In Peru, fishermen have attempted to kill dolphins by injecting live fish with toxins and tossing them into the water near the animals (Reeves *et al*. 1999, McGuire and Aliaga-Rossel 2010). Recent interviews with fisherman from Manacapurú area (Brazil), revealed that explosives are still being used in the jaraqui (*Semaprochilodus* sp) fishery (da Silva, Pers. Comm.).

Water development projects (dams, diversions etc.) are another major concern and an increasing threat to dolphins in the Amazon River basin (da Silva *et al*. 2015). In the Brazilian Amazon alone, 91 dams are planned. If constructed, these dams would flood about 10 million hectares, representing approximately 2% of the Legal Amazon region and about 3% of the Brazilian portion of the Amazon forest. Added to these, 74 dams are already in operation and 31 are under construction. Over 400 dams could be constructed in the Amazon basin eventually (Finer and Jenkins 2012, Forsberg *et al.*, 2017, Fearnside 2005). Despite the high number of operating dams and projects in the Amazon region today, and knowing that Tucuxis occur only below rapids in some rivers, of the 83 rivers with operating hydroelectric dams in Brazil only 13 had any kind of study involving dolphins (da Silva *et al*. 2015). Dams in the Amazon basin have degraded downstream habitat due to their effects on flow and temperature

regimes (Forsberg *et al.* 2017). Additional dams are bound to restrict dolphin movements, contribute to more fragmentation of populations, and continue to alter and degrade the habitat by opening commercialization networks, improving navigability, and increasing road access (Best and da Silva 1989, Pavanato *et al.* 2016).

High concentrations of organochlorine compounds (DDT, PCB, HCH, HCB, Mirex) and organobrominated compounds (PBDE) were found in Boto samples from different areas of the Brazilian Amazon, including the Solimões, Japurá, Negro, and Madeira rivers (Torres *et al*. 2007, Lailson-Brito *et al*. 2008. Mosquera-Guerra *et al*. 2018), as were heavy metals (Pfeiffer *et al*. 1993). Since Tucuxis occur in the same areas and feed exclusively on fish, it is likely that they have similarly high contaminant burdens.

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

The status of Tucuxis has been evaluated using the IUCN Red List Categories and Criteria in several of the range states. Those national assessments classified the species as Vulnerable in Colombia (Trujillo *et al*. 2006) and Endangered in Ecuador (Tirira 2011). In Brazil, the Tucuxi was classified as Data deficient (DD) until 2008 and it has been classified as Near Threatened (NT) since 2012 (ICMBio/MMA, 2014). In Peru, *S. fluviatilis* is protected by National Law No. 26585 of April 1996 and the Supreme Decree No.00296-PE of 1996 calls for the protection and conservation of small cetaceans and prohibits the consumption of cetacean meat as well as harassment, disturbance, harm, and injury to the animals (McGuire and Aliaga-Rossel 2010).

Additionally, there is a South American River Dolphins Action Plan (Trujillo *et al*. 2010a) and national river dolphin action plans for Ecuador (Utreras *et al.* 2013) and Colombia (Trujillo *et al*. 2006, Trujillo *et al*. 2014). In Brazil, the "National Action Plan for the Conservation of Aquatic Mammals – Small cetaceans", was published in 2011 (ICMBio, 2011) and a new Action Plan of the Aquatic Mammals of the Amazon was established (ICMBio 2019).

In 2020 the governments of Colombia, Brazil, Peru and Ecuador submitted a proposal for a Conservation Management Plan for South American river dolphins to the Scientific Committee of the International Whaling Commission.

The Tucuxi is listed in Appendix I of the Convention on International Trade in Endangered Species and in Appendix II of the Convention on Management of Migratory Species.

Credits

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Authority/Authorities: IUCN SSC Cetacean Specialist Group (dolphins, porpoises and whales)

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External Resources

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

Appendix

Habitats

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

Habitat	Season	Suitability	Major Importance?
5. Wetlands (inland) -> 5.1. Wetlands (inland) - Permanent Rivers/Streams/Creeks (includes waterfalls)	Resident	Suitable	Yes

Use and Trade

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

End Use	Local	National	International
Medicine - human & veterinary	Yes	No	No
Food - animal	Yes	Yes	No

Threats

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

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.4. Unintentional effects: (large scale) [harvest]	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.11. Dams (size unknown)	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.2. Industrial & military effluents -> 9.2.3. Type Unknown/Unrecorded	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.4. Type Unknown/Unrecorded	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		

Conservation Actions in Place

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

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: Yes
In-place land/water protection
Conservation sites identified: Yes, over entire range
Area based regional management plan: Yes
Occurs in at least one protected area: Yes
In-place education
Included in international legislation: Yes
Subject to any international management / trade controls: Yes

Conservation Actions Needed

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

Conservation Action Needed
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management

Research Needed

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

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.4. Harvest, use & livelihoods
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.2. Harvest level trends

Additional Data Fields

Distribution
Continuing decline in area of occupancy (AOO): Unknown
Extreme fluctuations in area of occupancy (AOO): No
Continuing decline in extent of occurrence (EOO): Unknown
Extreme fluctuations in extent of occurrence (EOO): No

Population
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 15.6

The IUCN Red List Partnership

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

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