



**Chapter 2**  
**Summary of threats for river dolphins in South America:**  
**Past, present and future**



### Summary of threats for river dolphins in South America: Past, present and future

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In the early eighties a great concern about the future of river dolphins led the Cetacean Specialist Group of the IUCN Species Survival Commission to concentrate their efforts on strategy to deal with those concerns. In 1986, the Workshop on Biology and Conservation of the Platanistoid Dolphins was the first step to assess issues related with threats and recommendations for the survival of river dolphins in the entire world (Perrin *et al.* 1989). This meeting encouraged some researchers in South America to start long term river projects related to river dolphins, especially in Brazil and Colombia. For almost ten years some important contributions about the distribution, biology and identification of threats were made. During

these years some documents were published. These documents were and are currently the lead information to all researchers involved in research, conservation and educational projects. These documents are the 1994-1998 Action Plan for the Conservation of Cetaceans (Reeves & Leatherwood 1994), International Whaling Commission Scientific Committee Report 2000, and the 2002-2010 Conservation Action Plan the World's Cetaceans (Reeves *et al.* 2003).

At the 1986 Workshop, the Amazon River Dolphin or Boto (*Inia geoffrensis*) was considered less common than the Tucuxi (*Sotalia fluviatilis*), the other freshwater South

American dolphin species, and therefore *Inia geoffrensis* was the only one included in the Report of the Workshop. Both species were included in reports and action plans thereafter, in which many direct and indirect threats to the species were determined and recommendations on these issues were made. Both threats and recommendations have changed over time according to reality and the new information on dolphins and their areas of distribution. Issues like the lack of information regarding ecology, behavior, abundance and density estimations, non-standardized data, incidental and direct mortality due to fisheries and the review of taxonomic classification for the genus *Inia*, are some of the current topics written down in Action Plans and Conservation Strategies, and in accordance to this the same recommendations are formulated. Today almost 20 year later, those efforts and recommendations are yielding

results and the commitment of researchers and conservationist organizations are getting stronger each day.

Summarized in this chapter are the main threats to river dolphins in South America and the end of the document a chart is included showing the different Action Plans and Conservation Strategies and the threats to each species and recommendations regarding each issue.

### Conflict with fisheries

This is one of the highest concerns and has been reported in every document related to conservation of both species. The problem is based on the overfishing taking place in almost all rivers of the basins of Amazon and Orinoco. The overexploitation of the aquatic resources

are leading fishermen to despair and to use fishing techniques that can be harmful to other aquatic species, as is the case of river dolphins and occasionally river otters. The decrease in the amount of appropriate sized fish, the increase in working hours on the river and the identification of potential competition in the activity of fishing are endangering dolphins. Many threats are related to this scenario:

1. The use of long nets across the river and in the mouth of streams and some lakes increases the chance of dolphins getting entangled and drowning.
2. The dolphins, specifically *Inia*, are regarded as a strong competitor for resources. In some areas dolphins steal or damage fish in nets, injuring the fishermen. People usually resort to killing or hurting the animal in many ways. They get shot, poisoned, hit or in the best case they are frightened with sounds or lemon drops are applied to their eyes.

### Deliberate killing of river dolphins

During the last 10 years, the mota fish *Calophysus macropterus* (Pisces, Pimelodidae) have appeared in the national market of Colombia, replacing the depleted capaz fish (*Pimelodus grosskopfii*) that inhabited the Magdalena river in Colombia. To catch the mota fish, dolphins and black caimans are being killed in the Brazilian Amazon to be used as bait to attract the scavenger fish (Trujillo *et al.* 2005, Gómez-Salazar *et al.* 2008, Flores *et al.* 2008). The capture of dolphins especially *Inia geoffrensis* are increasing resulting in serious threats for their population (Da Silva & Martin 2008).

Fishery and dolphin kills is occurring mainly in the Brazilian Amazon and the

commercialization of mota is occurring in Colombia, conforming a commercialization network starting by dolphin hunters, fishermen, gathering centers along the Amazon river (Brazil) big ships that transport the mota to Leticia, main gathering centers, main markets and consumers (Colombia). Dolphin kills are being monitored by the INPA Brazilian research group in the Mamiraua Reserve (Da Silva & Martin 2008).

At present, Mota fishermen and traders confirm that mota fish make up almost 80% of their production. A small percentage of catches take place in Venezuela and Peru, the fish being traded in that country and Colombia.

Since 2005, attempts have been made to implement initiatives among fishermen and traders to stop this killing and to introduce alternative baits, but there have been no results yet. The main facts of this new threat for river dolphins are:

1. Almost 200.000 tons of the Mota fish (*Calophysus macropterus*) is traded from Brazil to Colombia every year, and most of them are captured using dolphins and black caimans as bait.
2. Prices of the fish increase dramatically along the trade chain, with very little value in the region, and high prices in big cities.
3. In the big cities most of the consumers do not know how the mota fish is caught.
4. An estimate of 1500 dolphins are being killed each year only in the area of Mamiraua (Brazil) (Da Silva & Martin 2008).
5. Not statistic data of fisheries is available in the Brazilian Amazon to evaluate the amount of Mota fish caught.



Figure 14. Dead river dolphin.

6. Because the media display the problem especially in Manaus and Bogotá, D.C., dolphin hunters are killing dolphins in other areas as the river Purus (Brazil) and then sale the carcasses in the black markets.
7. The main market has been in Colombia, but during the last four years this fish is being sold as well as in Sao Paulo, Bahia and Minas Gerais under a different name (Pirosca).
8. Now the situation is more difficult regarding the spread of the market and also the areas where dolphins are being killed (Figure 15).

As regards to the geographic scale of this fishery, the deliberate killing of river dolphins may be the most serious threat for these species at present. This situation requires the attention of the Governments and specific regulations for this fishery.

### Direct catching

From the 50's to the 70's several dolphins (*Inia* and *Sotalia*) were caught for the purpose of display in aquariums. During the 90's some aquariums in the United States approached the Government of Venezuela to buy some *Inia geoffrensis*, but international lobbying stopped these operations. This bears witness to the poor legal control in each country, to the violation of the World Association Zoos and Aquariums Ethic Code, where it is clearly stated that members must "endeavor to ensure that the source of animals is confined to those born in human care and this will be best achieved by direct zoo to zoo conduct", and to the fact that conventions and international agreements aren't really being observed. Most recently the catch and sale of river dolphins has been reported in Peru.

### Use of dolphin's products

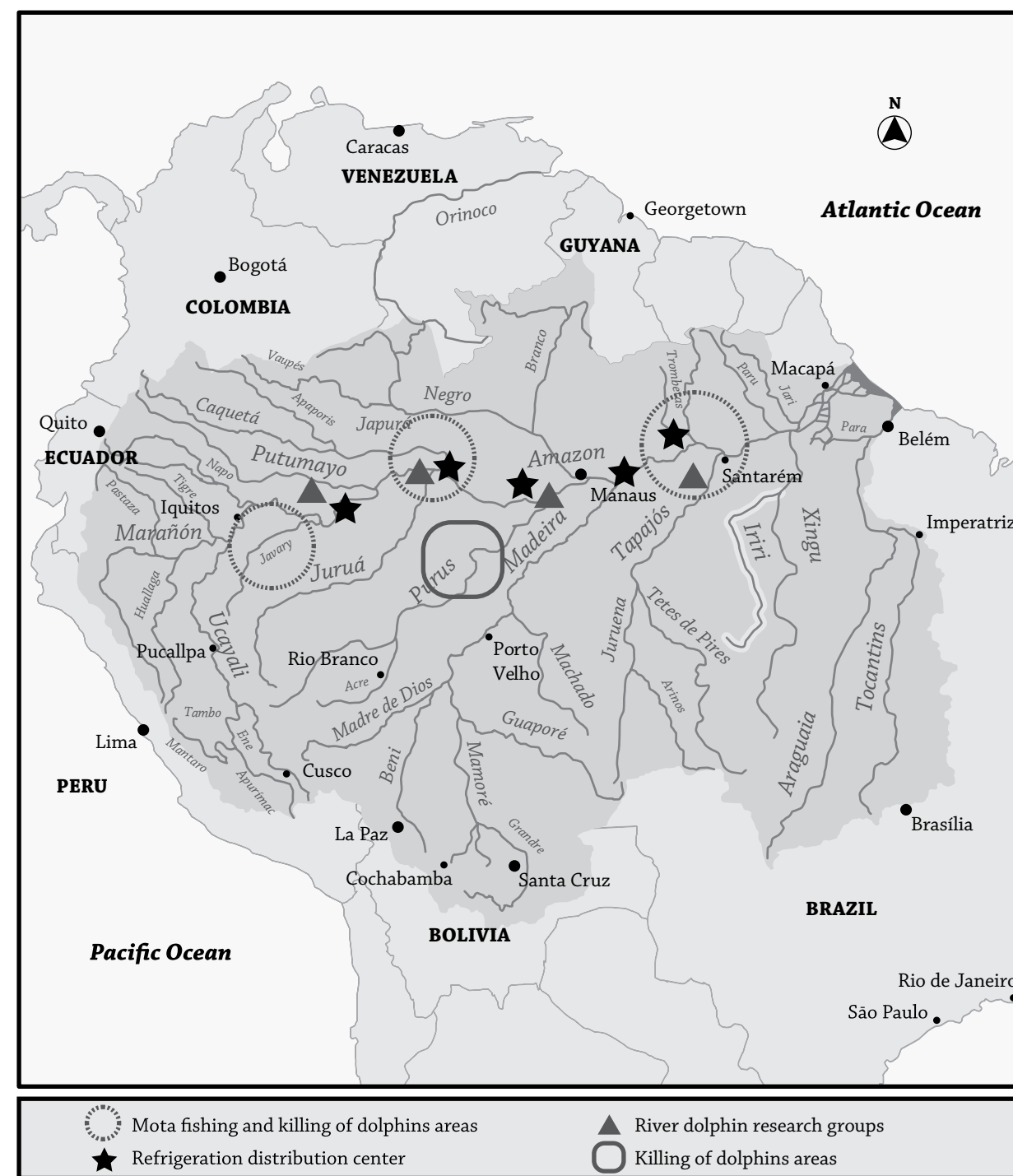
Use of dolphin products was first reported in 1986 concerning both species (Perrin *et al.* 1989). Related documents have reported on that issue since. Local communities use eyes, teeth, genitalia and skin. Oil is extracted from the skin in order to use it against respiratory diseases. Other body parts are used as love charms and in traditional medicine (Best & Da Silva 1989, Trujillo *et al.* 2006). This threat was probably important during the 70s and 80s and in many cases corresponded to incidental catches of dolphins in nets.

### Dam construction

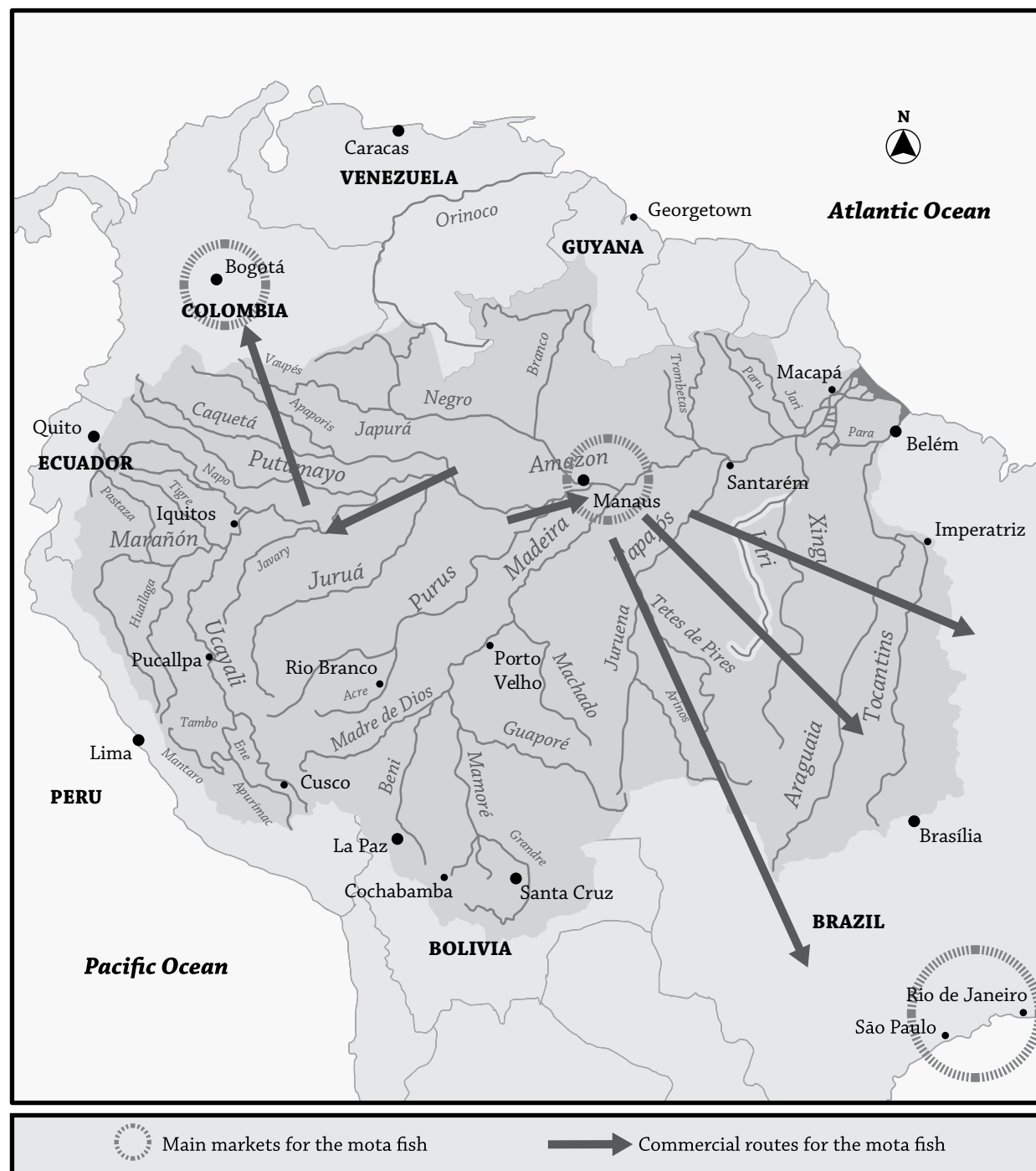
It constitutes an important threat for the species. Dams isolate dolphin populations and reduce the amount of consumible fish, interfering with their migration. The vast number of projects in the Amazon and a few in the Venezuelan Orinoco and the poor or almost lacking inclusion of dolphins and other freshwater species in plans prior to the construction, show that there is not governmental willingness to prevent environmental catastrophes such as the extinction of charismatic aquatic species in their countries and in the neighboring ones. Brazil is probably the only country that has constructed large dams such as the Belo Monte, Balbina, Tucuri with an area of more than 6.000 km<sup>2</sup> (Goulding, Barthem & Ferreira 2003, Fearside 2006), and with active plans to build more than 45 new dams, including the Jirau and San Antonio ones in the River Madeira, affecting river dolphins and other aquatic species that have migrations.

### Hydro-way construction

This is a potential threat for the whole area and it is motivated by economic interests



**Figure 15a.** Map showing the Mota fishing and killing of dolphin areas, river dolphin research groups and refrigeration distribution centers.



**Figure 15b.** Map showing the Main markets where the Mota fish is distributed and the commercial routs for the species.

and expansion of markets. This is the case of Brazil and the soybeans production looking for mechanisms of exportation from central and southern states to international markets (Goulding, Barthem & Ferreira 2003). Colombia and Venezuela have proposed along the last 30 years the interest of a water way along the River Meta to connect the Andes in the Atlantic Ocean. This project involves the construction of ports along the river and the transformation of the flooded pulses that will affect reproductive migrations of fish and reduction of sand banks affecting reproduction of turtles, birds and caimans. Alternative proposals such as a railway had emerged as a less negative environmental solution for the transportation of goods along the region.

**Water pollution**

The increasing rate of human population is increasing water pollution levels resulting from agriculture, industry and other anthropogenic activities. This threat has been reported in 2000 regarding both species and also on 2003 for *Inia* (IWC 2000, Reeves *et al.* 2003). Population increase was documented as a threat especially in Amazonian areas belonging to Colombia and Brazil. In Ecuador, this is also a threat and it is mainly due to the industrial expansion of oil companies in the Amazonian area. Human population growth has a similar pattern in all countries in the Amazon River Basin, with large deforested areas along the river shore.

**Landscape transformation and deforestation**

Different levels of habitat transformation are affecting the ecological integrity of the Amazon and Orinoco River Basins. Deforestation process is dramatic in Brazil and Peru due to logging and commercial agriculture. In Brazil the main threat for the forest has been deforestation by cattle ranching, and more recently biofuel crops, specifically soybeans, that provides economic and politic stimulation for new highways and infrastructure projects, which accelerate deforestation patterns Andersen *et al.* 2002). Between 2000 and 2006 Brazil lost nearly 15.000 km<sup>2</sup> of forest in the Amazon, and the process appears not to be abating.

**Mercury from gold extraction**

The use of this heavy metal is having an impact not only in the areas where gold is being extracted, but in areas far away from the extraction site. Mercury is a bio-accumulative element. After being released in the water, in the form of methyl-mercury, it attaches to the sediment, algae and macrophytes that are all part of the food chain. It means that the element will eventually reach dolphins, otters and human beings. This threat has been *evaluated* extensively in the Amazon, especially in Brazil (Martinelli *et al.* 1988; Lacerda & Salomons 1992, Nriagu 1993) Regarding aquatic species, most research has been conducted on fish (Bidone *et al.* 1997, Peixoto-Boischio *et al.* 2000, Trujillo, Gómez & Alonso 2008), showing high concentrations of mercury (Table 27) .

**Oil exploitation and production**

Oil exploration and exploitation are taking place in most of the countries where river dolphins are located. Perforations and use of

The main ecologic impact of deforestation in aquatic ecosystems is associated to the reduction of alocton food for fish, especially in small tributaries where an important number of species rely on the provision of seeds and fruits from the flooded forest.

**Table 27.** Values of Mercury found on fish in different geographic areas.

Geographic Area	Hg (ug.g <sup>-1</sup> )	Reference
Erie Lake, Canada	0,20 – 0,79	Mitra (1986)
Niigata, Japon	2,60 – 6,60	Inskip & Piotrowski (1995)
Tapajós, Amazon (Brazil)	0,15 – 0,73	Padberg <i>et al.</i> (1991)
Madeira, Amazon	0,21 – 2,70	Pfeiffer <i>et al.</i> (1991)
Lakes in Finlandia	0,21 – 1,80	Mannio <i>et al.</i> (1984)
Lakes Sweden	0,68 – 0,86	Bjorklund <i>et al.</i> (1984)
Carajás, Amazon (Brazil)	0,30 – 2,30	Lacerda <i>et al.</i> (1994)
Upper Amazon, Colombia	0,05 – 0,77	Trujillo, Gómez & Alonso (2008)
Orinoco River Basin, Colombia - Venezuela	0,03-3,44	Trujillo <i>et al.</i> 2010

big machinery increase the risk of spills. This has been observed recently in the Ecuadorian Amazon in the area of the Cuyabeno River. It is alarming that in countries as Ecuador, those camps of exploration and exploitation are located inside natural parks and reserves. Other kinds of oil spills were due to the Colombian guerrillas in the Colombian Orinoco during the 80s. Their guerilla warfare operations lead to water contamination and affect the habitat and fish resources.

**Boat traffic**

As a result of the unregulated ecotourism, the boat traffic is generating underwater noise pollution that affects dolphin populations as well as possibly causing collisions that can

hurt dolphins. This activity has been reported since 1994 to 2008 in almost all Action Plans. Additionally, continuous presence of boats can interfere with reproduction and feeding behavior.

**Bad tourism practices**

Tourism and specifically dolphin watching may be a good economic alternative for riverine communities in the Amazon and Orinoco basins. However, good practices and ethic codes should be promoted to avoid that this activity became a threat. During the last five years, some people are implementing feeding program of dolphins in two locations in Brazil without rules and creating serious problems

that can end in injuries for dolphins and people (Pinto de Sá Alves et al. 2009, Trujillo 2009, Romagnoli et al. 2010).

Feeding and swim-with-botos activities are promoted to tourists visiting the Brazilian Amazon and both activities have increased over the past decade. Tourists are now able to feed wild botos at many locations in the Brazilian Amazon and this lucrative activity is spreading to new locations all the time. In many cases, wild botos have already become habituated to human contact.

The most established location is at Novo Airão, a small town on the southern banks of the Negro River 115 km northwest of the city of Manaus. Locals have regularly fed botos since 1998, from a small floating restaurant.

Despite being located only approximately 10 meters from one of the city’s main streets, the restaurant is located inside the limits of the Anavilhanas National Park area (Pinto de Sá Alves et al. 2009).

The feeding of wild dolphins creates significant risks, both for the dolphins and for the tourists and these dangers are evident at Novo Airão. There are no strict regulations, inadequate infrastructure supporting this interaction and no specialized employee training or surveillance of the activity to minimize risks. Several cases of potentially harmful human behaviour have also been observed such as attempting to restrain or ride the dolphins, striking the dolphins and feeding inappropriate objects. Over time, competition amongst the provisioned botos for access to the fish has resulted in

**Table 28.** Identified threats for river dolphins since 1986 in Action Plans and river dolphins meetings.

*Inia geoffrensis*

Threats	1986	IUCN 1994-1998	IWC 2000	IUCN 2002-2010
Insufficient Data				
Fisheries conflict				
Direct catching (aquariums)				
Use of body parts				
Dam Construction	Brazil		Brazil	
Landscape transformation				
Deforestation				
Water pollution				

Mercury from gold extraction				
Oil exploitation and production				
Hydro-way (potential)				
Population increase				
Law				

*Sotalia fluviatilis*

Threats	1986	IUCN 1994-1998	IWC 2000	IUCN 2002-2010
Insufficient Data				
Use or body parts				
Direct catching(aquariums)				
Fisheries conflict				
Dam construction				
Landscape transformation				
Water pollution				
Mercury from gold extraction				
Boat Traffic				
Oil exploitation and production				
Hydro-way (potential)				
Law				

increased aggression, both between dolphins and toward the tourists. Botos pushing and shoving, leaping and biting both one another and tourists are now commonplace (Pinto de Sá Alves *et al.* 2009). This kind of escalation of dolphin's behavior from habituation to

increased confidence, assertiveness, 'pushiness' and potential eventual aggression was observed at Tangalooma, Australia. The risk of such behavior is widely understood in the case of provisioned wildlife.

**Law situation**

Some countries had passed laws to protect dolphins. Other countries need to enforce more intensively the ones that already exist (1986). On the other hand, there is poor control as to the compliance with current legislation (2008 CE).

the conservations of cetaceans (1994-1998 and 2002-2010) and finally, the Report of the Scientific Committee at the 52th Meeting of the International Whaling Commission in Australia in 2000.

**Status of river dolphins in South America**

During the last ten years the IUCN has promoted that each country undertake a specific analysis of the fauna and flora, taking into consideration that levels of threat can be different in each geographic region. Some countries have published their own red books of threatened species and others have published action plans. In both cases the classification criteria has always been that of IUCN.

**Identified threats in the different Action Plans that have considered river dolphins**

The following table (Table 28) summarizes the identified threats for river dolphins in action plans and specific meetings around river dolphins. The first one was in China in 1986; the second and third corresponded to IUCN/ Cetacean Specialist Group Action Plans for

**Table 29.** Conservation Status of River Dolphins in South America.

Country	<i>Inia geoffrensis</i>	<i>Inia boliviensis</i>	<i>Sotalia fluviatilis</i>	<i>Sotalia sp</i>	Source
Venezuela				VU A2d	Rodríguez & Rojas 2008
Colombia	VU A2acd+3de		VU A1acd+2ce		Rodríguez-Mahecha <i>et al.</i> 2006
Ecuador	EN C2a(i)		EN C2a(i)		Tirira, 2001
Peru	VU		NE		
Bolivia		VU			Ministerio de Medio Ambiente y Agua 2009
Brazil	VU		DD		IBAMA 1997

Based on the results obtained during the evaluations of abundance of river dolphins in South America, the analysis of threat for the categorization of the IUCN is suggested. In addition to considering the status of the species in each country, an evaluation by hydrographic river basin and sub basin should commence, which would be the unit most appropriate

for ecological analysis. The Convention on Migratory Species (CMS) and WWF report that these species are migratory and move between countries, especially in the Amazon basin, so again, a watershed assessment would be most appropriate to determine the level of threat.