

SC/67B/SM/13

# Unrecognized and so many threats: case studies in conservation of the Araguaian Boto (*Inia araguaiaensis*)

Renata Emin-Lima, Salvatore Siciliano, Reginaldo H. M. Moreira Junior, Thais S. Pereira, Tayanna M. M. M. Amaral and Wlainer Silva de Paula



INTERNATIONAL  
WHALING COMMISSION

# ***Unrecognized and so many threats: case studies in conservation of the Araguaian Boto (*Inia araguaiaensis*)\****

**Renata Emin-Lima<sup>1</sup>, Salvatore Siciliano<sup>2</sup>, Reginaldo H. M. Moreira Junior<sup>1</sup>, Thais S. Pereira<sup>3</sup>, Tayanna M. M. M. Amaral<sup>1</sup> and Wlainer Silva de Paula<sup>4</sup>**

<sup>1</sup>Grupo de Estudos de Mamíferos Aquáticos da Amazônia (GEMAM). Programa de Capacitação Institucional, Setor de Mastozoologia, Coordenação de Zoologia, Museu Paraense Emílio Goeldi. Av. Perimetral, 1901, 66077-530 Belém, PA, Brazil

<sup>2</sup>Laboratório de Referência Nacional de Enteroinfecções Bacterianas, Instituto Oswaldo Cruz/Fiocruz (LABENT, IOC/Fiocruz), Pavilhão Rocha Lima, 3º andar, Av. Brasil 4.365, 21040-360 Rio de Janeiro, RJ, Brazil & Grupo de Estudos de Mamíferos Marinhos da Região dos Lagos (GEMM – Lagos), Praia Seca, Araruama, RJ, Brazil

<sup>3</sup>Instituto Araguaia de Proteção Ambiental, Parque Estadual do Cantão, Rodovia TO-080, 77680-000 Caseara, TO, Brazil and Programa de Pós-Graduação em Ecologia, Universidade Federal do Pará, Instituto de Ciências Biológicas, Av. Augusto Corrêa, 1, 66075-110 Belém, PA, Brazil

<sup>4</sup>Condomínio Mansões Entre Lagos, Etapa 01, Conjunto X, Lote 28, 73255-900 Sobradinho, DF, Brazil

(\*) This is a contribution to SM Subcommittee, SC67b Bled, Slovenia 2018

Contact e-mail: [sotalias@gmail.com](mailto:sotalias@gmail.com)

## **Introduction**

This document addresses threats related to the unrecognized species of river dolphin *Inia araguaiaensis* (Hrbek *et al.* 2014). Current threats include river damming, water pumping for agriculture, fisheries interactions, intentional killing, high boat traffic, water contamination by sewage, heavy metals and other chemicals. Information is updated from previous sources (Araújo and da Silva, 2014; Siciliano *et al.* 2016) and is presented in a summarized table of contents with the respective ranking of threat.

## **Background information on morphology and genetics of *I. araguaiaensis***

The Taxonomy Committee of the Society for Marine Mammalogy (SMM) currently recognizes a single species of *Inia* (i.e. *I. geoffrensis*). The new species, *I. araguaiaensis* (Hrbek *et al.*, 2014) diagnosis was based on the examination of very few specimens (only three skulls for the new species and only nine skulls for *I. geoffrensis*). In fact, the SMM Committee noted that the Hrbek *et al.*, (2014) study only examined samples from two extremes of the distribution of *Inia*, so it is unclear if the molecular differences observed represented real species-level separation or were due to sampling from two locations separated by a large distance.

There is an ongoing post-doctoral study carried out by the principal author of this document, entitled: Morphological diagnosis of Araguaian boto (*Inia araguaiaensis*). The mammal collection of Museu Paraense Emílio Goeldi (MPEG), Museu de Zoologia de São Paulo (MZUSP), Museu Nacional (MN/UFRJ), Pontifícia Universidade Católica de Minas Gerais (PUCMG), Universidade Federal de Tocantins (UFT) and American Museum of Natural History (AMNH) and Smithsonian Institution (SI) were visited in 2016 and 2017. As a result, based on the specimens examined, nine *I. araguaiaensis* are deposited in MPEG, one in MZUSP, two in MN/UFRJ, one in PUCMG, and one in UFT, totaling 14 specimens. It is noteworthy to mention how Araguaian boto is rare in scientific collections, which limits more conclusive taxonomic analyzes. In the last two years, biopsy and carcasses samples were collected in the localities of Cametá and Mocajuba, In Pará state, and some other places is Tocantins. Analyses for sex determination and evaluation of possible sympatry zone with *I. geoffrensis* are under way.

## **Conservation issues and stat: Threats**

### ***River damming***

According to a recent report (Akama, 2017) at least 48 fish species are under some threat in Tocantins River as it gets dammed by hydroelectrical power plants (HPP). Changes in the species composition and connectivity will certainly impact dramatically the diversity and abundance of fish. So far, seven HPP are operating in Tocantins River: HUE Tucuruí,

HUE Serra da Mesa, HUE Lajeado, HUE Canabrava, HUE Peixe Angical, HUE São Salvador, HUE Estreito, and another one planned called HUE Marabá (Akama, 2017). This later is planned to na area free of dam along Tocantins River (see Figure for details).

***Water pumping for agriculture, low water level and translocation of boto***

The Araguaia-Tocantins basin is ruled by two hydrological periods: the dry season, that lasts for six months, from June to November and the rainy season from December to May (ANA, 2012). From November on, water level drops steadily and sand bars are formed (Figure 1). During the dry period, the rivers become segmented in various portions with different lengths and depths, reducing the water level available to botos. It is possible to see botos crossing shallow sections of the rivers, around 60 cm of depth. These crossing points between river stretches are used frequently, sometimes daily, and only stops when water level is below 30 cm. At this point, botos can be seen confined in pools in several stretches of the rivers or lakes, where they will remain until the end of the dry period. The Formoso River has the largest irrigation project in Tocantins state. The State Environment Agency authorizes farmers to pump water during the dry season and to build dams to collect more water (Figures 2 to 7). In 2016, 12 Araguaian botos had to be rescued and translocated to the main stream of the Araguaia River (Figure 3). Severe drought combined with the pumping of water from the river for irrigation resulted in this dramatic situation that led to the translocation. This operation was conducted in Marião River, in Pará, and Formoso River, in Tocantins. The latter is the main affluent of Javaés River, that flows into Araguaia River, and has at least 50 water pumps for agriculture irrigation inside five dams.



Figure 1. Changing levels of the Côco River, affluent of the Araguaia River, during the dry season, from May to September 2016. Source: Instituto Araguaia de Proteção Ambiental



Figure 2: Pump used to take water from rivers in Tocantins during the dry season for agriculture use. Source: Instituto Araguaia de Proteção Ambiental



Figure 3. One of the numerous dams made for collecting waters in Formoso River and tributaries. Source: Instituto Araguaia de Proteção Ambiental



Figure 4. Sand beaches are formed during the dry season in Araguaia River.





Figure 5. Very low levels of water observed in rivers of the Araguaia-Tocantins basin during the 2016 drought.



Figure 6 and 7. Rescue and translocation of botos from Lagoa da Confusão, Formoso River, Tocantins in August 2016.  
Source: Instituto Araguaia de Proteção Ambiental

Interestingly, Araguaian botos seem to have evolved to cross shallow sections of the river during the dry season. It has been observed mothers teaching calves to cross sand bars to access deeper channels in the river. On the other hand, botos seem also to be adapted to live isolated in some sections of the rivers. In Côco River, Tocantins, botos are monitored since 2015 as they live isolated in stretches of the river that varies in size. This river has no pump, or any dam installed.

### ***Fisheries interactions***

Incidental captures of botos are reported to occur in gillnets used by the Soure fleet, off Marajó Island (Ventura, 2018). Boat masters are requested to fill in data reports and information on incidental captures are received.

Very recently, On February 2, 2018 a young Araguaian boto was captured incidentally in a gillnet in Tocantins River, Marabá. The boto was released alive from the net by environmental agents (Figure x).



Figure 8. Araguaian boto incidentally caught by gillnet and released, Marabá, Pará, 02 Feb 2018.

Source: Rádio Marabá

### ***Provisioning botos***

Information on provisioning of botos is very similar to the one presented in 2016. Botos have been photo-identified by a recent study and a catalogue of natural marks is under way (Moreira Junior, 2017). The new issue is the advertisement of a so-called “boto provisioning program” to tourists as a therapeutic treatment, supervised by expert biologists. This information needs to be more deeply investigated as it seems to have some negative implications for the botos in the area. Special concern should be given to water quality in these areas, as they are usually located in front of the central market of the town. Raw sewage is discharged in the same location where botos are found. Threats are the same for botos and people.

### ***Water contamination by heavy metals and other chemicals***

Norwegian alumina refinery Norsk Hydro's Alunorte located in Brazil made unauthorized spills of waste water in February, 2018, after heavy rains (<https://www.reuters.com/article/us-norsk-hydro-brazil/norways-hydro-says-brazil-plant-made-unauthorized-spills-idUSKCN1GN0SN>). The Hydro Alunorte plant, located in the industrial center of the municipality of Barcarena in Pará state, is the world's largest alumina refinery. On February 17, 2018, bauxite was leaked from the mining barrages due to the spillage from damaged channels or from retaining-dyke failure.

According to the Instituto Evandro Chagas (IEC), a public health reference in the Pará state, concerning concentrations of 14 chemical elements were released to the environment, including some highly harmful to the organisms exposed (e.g. arsenic, lead, manganese, mercury, cadmium, uranium, aluminum and copper) (<https://g1.globo.com/pa/para/noticia/laudo-confirma-vazamento-de-rejeitos-de-mineradora-em-barcarena-no-pa.ghtml>). Although the IEC report have been questioned by the consultancy of Hydro (<http://sustentabilidade.estadao.com.br/noticias/geral/consultoria-da-hydro-desqualifica-laudos-de-contaminacao-no-para,70002264569>

This represents another threat to the populations of Araguaian river dolphin, which has been recorded in this section of the river Pará adjacent to the plant.

### **Conservation Status**

The limited range of the Araguaian boto, restricted to a river basin (Araguaia-Tocantins) and adjacent Marajó bay has implications for its conservation. First, its major habitat is surrounded by the Cerrado vegetation of central Brazil, which is so far heavily modified by human activities. Large scale agriculture and cattle farming have transformed the landscape in most of the river sections. Side effects of these large-scale activities include massive use of agrotoxics that enter the land and finish their way into the river (Bombardi, 2017). Large growing cities and agriculture activity need a huge amount of energy. Seven hydroelectrical power plants are already operating in Tocantins River and a large one is projected to the upper part of the river in Marabá (See Figure 9 for details)..

Despite its unrecognizable status by IUCN, the Araguaian boto should be regarded the status of a subpopulation or management unit under special concern.



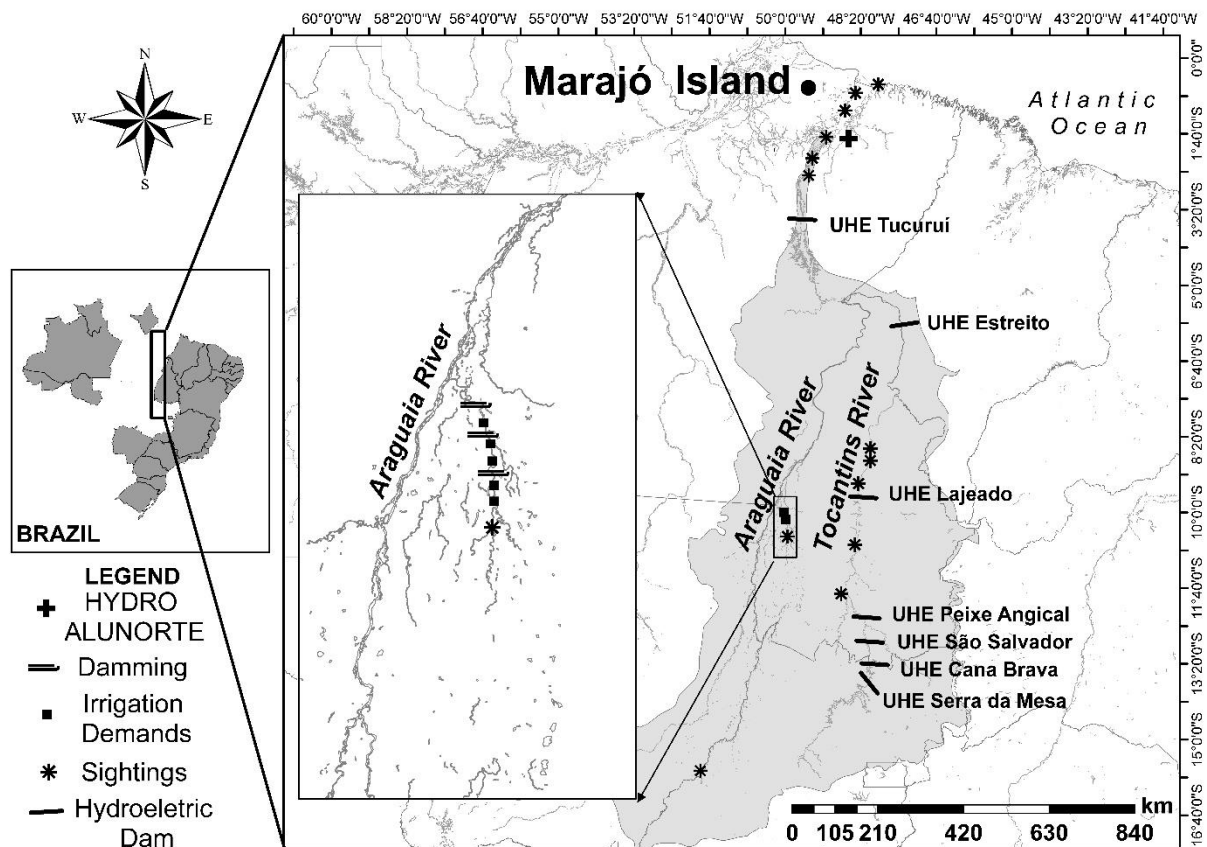


Figure 9. Sites of confirmed occurrence of Araguaian river dolphins and the various anthropic threats to which their populations are subject

## Literature Cited

- Akama, A. (2017). Impacts of the hydroelectric power generation over the fish fauna of the Tocantins River, Brazil: Marabá dam, the final blow. *Oecologia Australis*, 21(2), 222–231. <https://doi.org/10.4257/oeco.2017.2103.01>
- Bombardi, L. M. (2017). *Geografia do Uso de Agrotóxicos no Brasil e Conexões com a União Européia* (1st ed.). São Paulo, SP: FFLCH, USP.
- Dos Santos, G. M. A., Rodrigues, A. F., Arcoverde, D. L., Ramos, I., Sena, L., & Silva, M. L. (2014). Unusual records of the behavior of boto *Inia* sp. (Cetartiodactyla, Iniidae) in the lower reaches of the Tocantins and Guamá rivers, Amazônia. In J. B. Samuels (Ed.), *Dolphins: Ecology, Behavior and Conservation Strategies* (pp. 165–182). New York, USA: Nova Science Pub Inc.
- Hrbek, T., da Silva, V. M. F., Dutra, N., Gravena, W., Martin, A. R., & Farias, I. P. (2014). A new species of river dolphin from Brazil or: how little do we know our biodiversity. *PloS One*, 9(1), e83623. <https://doi.org/10.1371/journal.pone.0083623>
- Moreira Junior, R. H. M. (2017). Avaliação da população de botos-do-Araguaia (Cetacea: Iniidae: *Inia araguaiaensis* Hrbek et al., 2014) no baixo rio Tocantins, Amazônia Oriental. Dissertação de Mestrado, UFPA, Belém - PA. 47pp. Ramos-Santos, 2017
- Siciliano, S., Valiati, V. H., Emin-Lima, R., Costa, A. F., Sartor, J., Dorneles, T., Sousa e Silva Júnior, J. and de Oliveira, L. R. (2016). New genetic data extend the range of river dolphins *Inia* in the Amazon Delta. *Hydrobiologia*, 777(1), 255–269. <https://doi.org/10.1007/s10750-016-2794-7>

Ventura, J. (2018). *Estimativa da captura acidental de pequenos cetáceos pela frota de barcos de pequeno porte da costa leste da Ilha de Marajó, Pará, Brasil*. Relatório Parcial do Programa de Iniciação Científica Museu Paraense Emílio Goeldi (PIBIC/MPEG/CNPq).

ANA (2012). Monitoramento Hidrológico no Setor Elétrico (Hydrological Monitoring in the Electricity Sector). Brasília: Agencia Nacional de Águas.  
[http://www2.ana.gov.br/Paginas/servicos/informacoes\\_hidrologicas/monitoramento\\_hidro.aspx](http://www2.ana.gov.br/Paginas/servicos/informacoes_hidrologicas/monitoramento_hidro.aspx).

**Table 1. Summary of threats affecting Araguaian botos**

<b>Threat</b>	<b>Location</b>	<b>Cause of Concern (Very high=V, H=High, M=Medium, L=Low)</b>	<b>Reference or Source of Information</b>	<b>Comments</b>
<b>River damming</b>	<b>Tocantins and Pará</b>	<b>V</b>	<b>Akama (2017)</b>	<b>Seven hydroelectrical power plants operating, one large planned in Marabá</b>
<b>Water pumping for agriculture</b>	<b>Tocantins: Formoso River</b>	<b>H</b>	<b>This study</b>	<b>Operates during the dry season when water level is already low</b>
<b>Fisheries interactions, mainly gillnets</b>	<b>Pará: Praia do Geladinho, Marabá</b>	<b>M</b>	<b>This study</b>	<b>One boto caught and released in Marabá</b>
<b>Intentional killing</b>	<b>Araguaia River: Aruanã, Goiás</b>	<b>H</b>	<b>Araújo and da Silva (2014)</b>	<b>10 botos killed in July 2009</b>
<b>Provisioning</b>	<b>Pará: Mocajuba and Cametá; Luciara (Mato Grosso)</b>	<b>M</b>	<b>Santos et al. (2014); Moreira Junior (2017); This study</b>	
<b>Water quality (sewage)</b>	<b>Pará: Mocajuba and Camará</b>	<b>M</b>	<b>Siciliano et al. (2016); This study</b>	
<b>Water contamination (heavy metals and other chemicals)</b>	<b>Pará: Barcarena</b>	<b>M</b>	<b>This study</b>	
<b>High boat traffic</b>	<b>Araguaia River</b>	<b>L</b>	<b>Araújo and da Silva (2014)</b>	<b>Seasonal, summer time</b>