



**02111212_Population Trends and Conservation Status of *Mico
marcai* in Aripuanã River Basin, Amazon, Brazil**

Brazil – Latin America – Amazon

FINAL REPORT

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Section 1:

Summary

The Marcaø marmoset (*Mico marcai*) was described in 1993, based in three skins collected during the Scientific Expedition Roosevelt-Rondon in 1914 (Alperin 1993; 2002). Those skins were the only register of the species. Our objective was to confirm the Marcaø marmoset existence on nature, make the first evaluation of its occurrence and distribution and to identify the potential threats. In 2013 and 2014, five expeditions were conducted on the MarmelosóAripuanã and MadeiraóGuariba interfluves (07°09'01"S - 7°48'10"S, 60°41'06"W 60°59'12"W) totalizing 63 days of field work. We conducted interviews with local people and visited 22 localities where we sighted *Mico marcai* in 18 occasions. Other twelve primate taxa were registered. Our records of *Mico chrysoleucus* and *Callibella humilis* extend the distributions in their south limit. A new species of *Callicebus* was found in Roosevelt-Guariba interfluves.

Introduction

In the last decade, more than 1200 new species of plants and vertebrates have been described in Amazon Rainforest (WWF 2010). However, the poor information available on basic aspects such as taxonomy, distribution and population parameters does not enable a reliable assessment of the conservation status of these species.

According to the Primate Specialist Group, Brazil is home of the greatest primate diversity. Since 1990 were described 7 new species of *Mico* (Rylands & Mittermeier 2009; Rylands et al 2012) and a new genus (*Callibella*; van Roosmalen & van Roosmalen 2003). Most of these findings occurred in the region of Madeira River basin where more studies are required about the local biodiversity. The main tributaries of Madeira River are the Aripuanã and Marmelos rivers. The region has one of the highest deforestation rates in the Amazon, being known as õDeforestation Archõ.

Mico marcai and *Mico manicorensis* are expected to be found in the interfluves MarmelosóAripuanã (Fig 1) (van Roosmalen *et al.* 2000; Alperin 2002; Rylands &

Silva Jr. 2008), but the taxonomy and the distribution of these species are controversial. *Mico marcai* was described in 1993 by Alperin (1993) based on three skins stored in National Museum of Rio de Janeiro. These skins were collected in 1914 in the confluence of Aripuanã and Roosevelt rivers during the Roosevelt-Rondon Scientific Expedition. The only information available about this species were the collection site and the date.

van Roosmalen et al. (2000) described *Mico manicorensis* and provided a map of the geographical distribution for this species which included the type-locality of *Mico marcai* in the confluence of Roosevelt and Aripuanã rivers. However, Alperin (2002) pointed out that the southern limit of range proposed by van Roosmalen *et al.* (2000) would be wrong because it encompasses the area where the holotype of *Mico marcai* was collected.

In January 2012 we conducted a preliminary field assessment and we confirmed the current presence of *Mico marcai* in the wild (Silva *et al.* 2013), almost a hundred years after the sole documented record made by Roosevelt-Rondon in 1914. After that, the project was linked to Mamirauá Institute for Sustainable Development (IDSM) and was supported by Conservation Leadership Programme (CLP). It was very important to improve our network and to consolidate the project in a region poorly studied.

After the first time that we recorded *Mico marcai* the following question arose: Could be *Mico manicorensis* (van Roosmalen 2000) a synonymous of *Mico marcai* (Alperin 1993)? The first step was to survey the forests in the interfluvio Marmelosó Aripuanã, where both *Mico* species were expected to be found (van Roosmalen *et al.* 2000, Alperin 2002). Our survey provided the first data on geographical distribution of *Mico marcai in situ* and the taxonomic status of *M. marcai* and *M. manicorensis*. We are conducting several morphological and molecular analysis in a partnership with

IDSME, Emílio Goeldi Museum, Amazonas Federal University, Brasília Federal University e University of Salford. The first taxonomic assessment of marmosets from MarmelosóAripuanã interfluvies is present here, based on molecular analysis. Two publications about the taxonomy and distribution of these marmosets are been prepared, also with the support of the institutions mentioned above.

These species are considered as Data Deficient (DD) in the latest assessment of the IUCN Red List (Rylands & Silva Jr. 2008). The results of this project will contribute to understand their Conservation Status and to purpose measures for their protection.

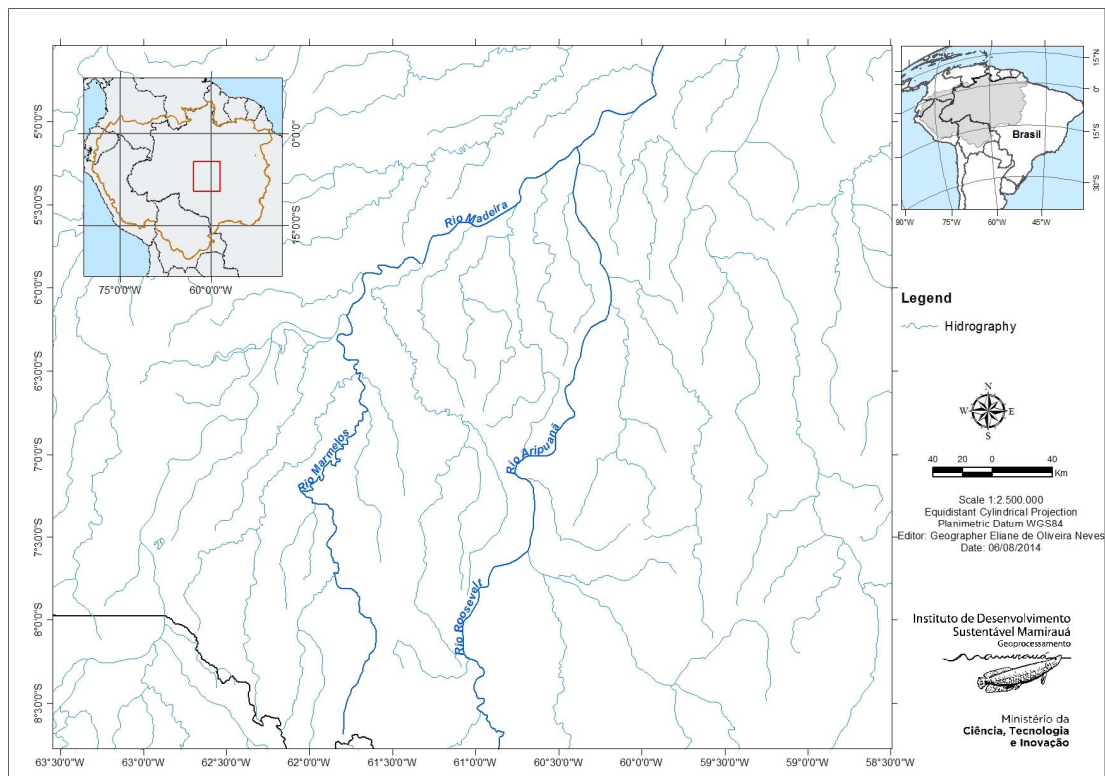


Figure 1 ó Study area in the MarmelosóAripuanã interfluvies.

Project Members

Felipe Ennes Silva: Team Leader (34)

Felipe is Fellow Researcher in Mamirauá Institute for Sustainable Development where he are conducting two projects. The first one, supported by Conservation Leadership Programme, aims to investigate aspects of the Taxonomy, Distribution and Conservation of *Mico marcai* in MarmelosóAripuanã interfluve. The second one aims to investigate the Taxonomy, Ecology and Conservation of white-uacaris (*Cacajao calvus calvus*) in middle Solimões River. Felipe organize the Expeditions, conduct the first meetings with local communities and with the partner researchers.

Hermano Gomes Lopes Nunes: Team member (27 y)

Hermano is MSc in Zoology working as Professor from the Government of Parába State. He has experience in Ecology and Behavior of Callithrichidae Primates and performed an intensive data collection on the behavior of groups of Golden Lion Tamarins and Marmosets during his Master thesis. Recently, Hermano was selected to attend in the Pre-Congress Training Program, a workshop promoted by International Primatological Society (IPS) in Hanoi, Vietnam. Since the first Expedition of the *Mico marcai* Project he collected data on distribution of this species as well as on the Primate diversity in MarmelosóAripuanã interfluve. Hermano has experience with interviews and he established the first contact with local communities in two hard to reach field sites. He is working in the dissemination of the results of *Mico marcai* Project through scientific articles and general media.

Rodrigo Costa Araújo: Team member (32y)

Rodrigo is Biologist, MSc in Ecology working as an independent consultant, coordinating and executing primate survey and monitoring at South Bahia for BIOCEV Serviços e Consultoria Ambiental. He has experience on ecological scientific research in the field and laboratory work, mainly focused on primates, vegetation and on biological conservation in Brazil. He also worked with ecology and conservation of deciduous forests and coastal vegetation at South Brazil. Rodrigo joined *Mico marcai* Project in 2012 and has contributing to plan surveys, data analysis and on publishing the results.

Section 2:

Aim and objectives (max 200 words)

The aim of this project is to establish a framework for the *Mico marcai* Conservation. The key objectives were:

- 1 ó To verify the occurrence and distribution of *Mico marcai*;
- 2 ó To register the presence of other primate species in the region;
- 3 ó To identify the main threats for *Mico marcai*;
- 4 ó To strength the relationship with local communities, enabling a long-term research cooperation with positive impacts for primate conservation;
- 5 ó To include *Mico marcai* in the National Action Plan for Amazon Primates

Changes and adaptations in objectives

To get better information about the distribution of *Mico marcai* we visited more localities than previously planned and registered the presence of other primate species between Marmelos and Aripuanã rivers. Thus, we did not collect data about the population density and abundance because it will require a long time to get a good number of sightings to assess this population parameters sampling a small number of localities.

Methodology (max 500 words)

Objective 1 – To verify the occurrence and distribution of *Mico marcai* and *Objective 2* – Evaluate the regional primate diversity.

During 2013 and 2014 we conducted five expeditions on the MarmelosóAripuanã and MadeiraóGuariba interfluves (07°09'01"S - 7°48'10"S, 60°41'06"W 60°59'12"W) totalizing 63 days of field work. We concentrated our field efforts in (1) the confluence of Roosevelt and Aripuanã rivers, (2) in the low and upper Manicoré River and in (3) the middle Aripuanã River. These regions represent the main potential limits for *Mico marcai* geographical distribution since we know the species with occurrence in east bank of Aripuanã and west bank of Marmelos rivers (see Ferrari 1993 and Rohe 2007). At these site we interviewed 45 local residents to get information about the local primate community, mainly focused on the possible presence of *Mico* sp.. We then visited 22 places mentioned on the interviews. The primate diversity of the MarmelosóAripuanã interfluve was unknown and our field efforts provided the first check list of the primate species for this site. All primate sightings were geo-referenced with Global Position System (GPS) devices and a map of *Mico marcai* distribution (Silva *et al.* in. prep.) was elaborated using the software ArcGis.

Objective 3 – Check the main threats to *Mico marcai*;

We registered the land use by the local communities and the main economic activities at the region through the Brazilian Institute for Geography and Statistics (IBGE) database. The habitat loss was estimated from the deforested areas identified until 2012 by the Project Monitoring of the Brazilian Forest by Satellite (ProDes Project) (ProDes, 2014). In addition, we assess the technical reports of the Federal

Agency of Electric Energy (ANEEL) to estimate the area that will be flooded for the implementation of seven hydroelectric schemes at Aripuanã and Roosevelt rivers. We also investigated the hunting and the living capture of primates by human populations *in situ*.

Objective 4 6 To establish and to strengthen the relationships with local communities

We conducted meetings in three local communities (Matá-Matá, Bela Vista do Guariba and Mocambo) to inform about the project and to introduce the main objectives while working with Primates at that region. It was important to get the support of the local people and to give the first steps to implement other activities in that region (Primate census; monitoring of marmosets; Environmental Education in the local schools).

Objective 5 6 To include *Mico marcai* in the National Action Plan for Amazon Primates;

We linked the project with Mamirauá Institute for Sustainable Development (IDSM) for its formal execution and established a partnership with other five Institutions. As part of this network our results will be included in the Evaluation of Conservation Status of Brazilian Fauna promoted by the Ministry of Environment.

Outputs and Results (max 500 words)

Our first molecular assessment shows that *Mico manicorensis* is a junior synonymous of *Mico marcai* (Fig. 3), based on the 16s mitochondrial marker (Silva *et al.* in prep). In addition, we are conducting morphological analyzes of the recently collected specimens to improve our taxonomic assessment, in partnership with the Emilio Goeldi Museum and the Brasília Federal University.

Mico marcai were observed (Fig. 4) on 14 from 22 localities visited. We recorded *M. marcai* in the left bank of Aripuanã River, near the type-locality (Alperin 2002). At the right bank of Aripuanã River we registered *Mico chrysoleucus*, extending the southern limit of their range (Silva *et al.* in prep). Thus, Aripuanã River is the eastern limit of the *Mico marcai* distribution, as we expected. We also registered *M. marcai* at both banks of Manicoré River, confirming that this river is not a barrier for this species dispersal. Furthermore, we registered the Marcaç Marmoset in the left bank

of Branco River, a small tributary of the Marmelos River. Thus, the western limit of *M. marcai* is the Marmelos River. The distribution of this species covers a total area of 48,895 km² South to Madeira River, between the Marmelos (at West) and Aripuanã (at East) rivers (Fig. 5) and is probably limited by the savanna vegetation of Campos Amazônicos National Park, at South.

Besides *Mico marcai*, we also recorded 11 primate species (Tab. 1), including one new species of *Callicebus* in the right bank of Roosevelt River (Dalponte *et al.* in press). At the right bank of Aripuanã River we registered *Mico chrysoleucus*, extending its southern range limit (Silva *et al.* in prep).

The living capture of primates was registered on the sites visited (Fig. 6). We recorded four woolly-monkeys (*Lagothrix cana*) and five marmosets kept as PET. These findings highlights the need for more detailed studies about the impacts of hunting and living capture on primates populations at the Aripuanã River basin.

Nonetheless, the main threat for primate conservation is the habitat loss due to selective logging and forest conversion for cattle ranching. On the cities of Apuí, Novo Aripuanã and Manicoré, the herd grew from 122,898 head of cattle in 2004 to 263,684 in 2011 (IBGE 2013). Furthermore these cities registered a high rate of forest loss, totalling 4,639.3 km² in the last 10 years (PRODES 2014).

Besides logging and clear-cutting for cattle ranching, the Federal Agency of Electric Energy approved the construction of seven hydroelectric plants in the Aripuanã and Rosevelt rivers (ANEEL 2012; document attached). Among the seven schemes, three will flood 900km² of forests at the Aripuanã River basin. Yet, 640 families of traditional populations will be displaced only by one of those hydroelectric plants. Furthermore, there are three Federal protected areas and seven indigenous lands formally recognized, which covers 35% of the *Mico marcai* range. These infrastructure will also negatively affect all these protected areas and, at least, five indigenous lands.



Figure 2 ó The Phylogenetic tree retrieved for genus *Mico* and *Callibella* according to our first assessment based in 16s mitochondrial gene. All the specimens of *Mico marcai* are in the same clade of the holotype of *Mico manicorensis*. The specimens õ2955 *Mico emiliae*ö was collected by Ferrari (1993) (see the section õAchievements and Impactsö).



Figure 3 ó *Mico marcai*. In the left, photo taken by Marcelo Santana. In the right drawing by Stephen Nash;

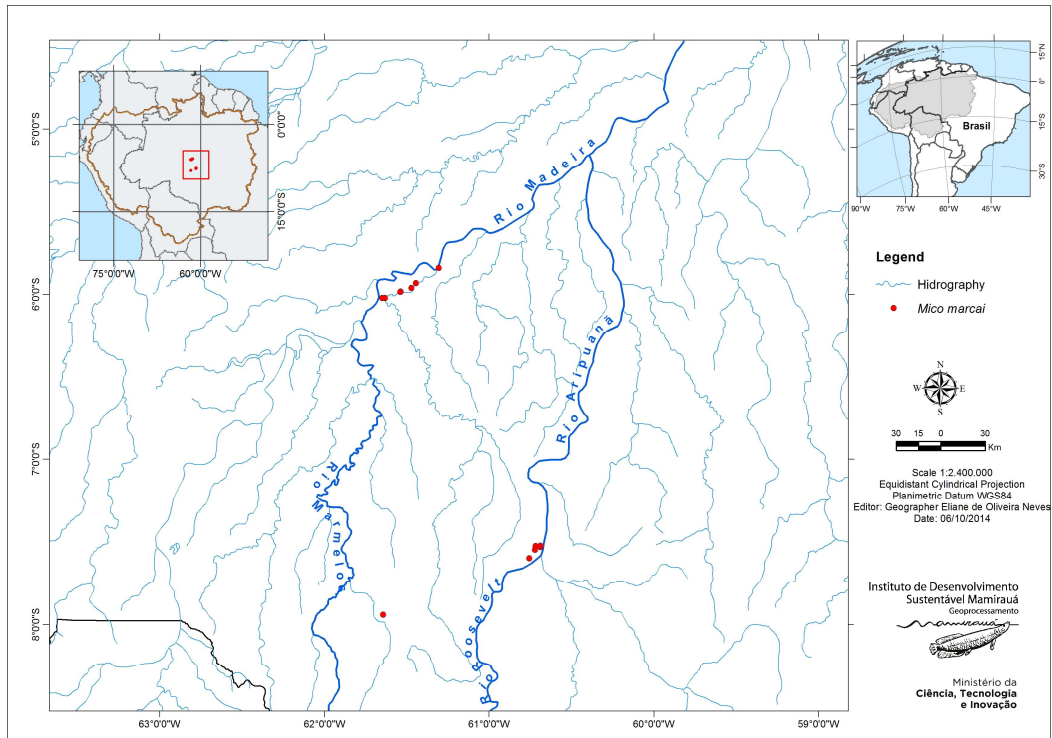


Figure 4 ó The localities where we registered the presence of *Mico marcai*.

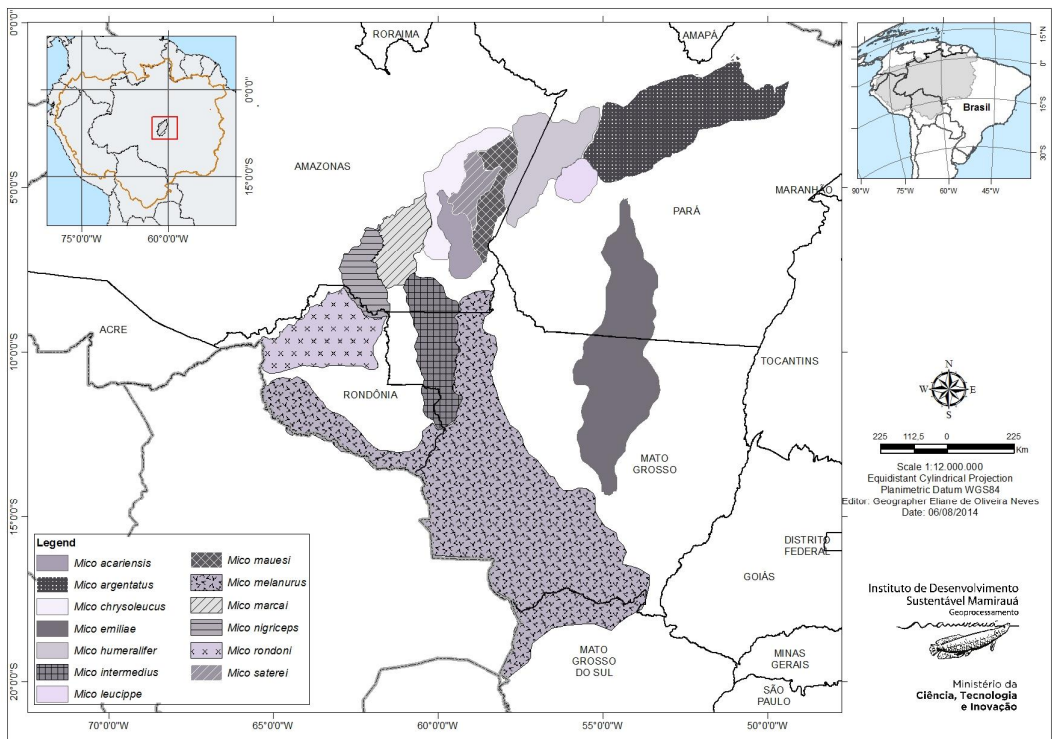


Figure 5 ó The current Amazon marmosets distribution.

Table 1. Primate species recorded thru sighting in the surveyed areas, on five field expeditions to Aripuanã River basin, Amazonas (LB = left bank; RB = right bank).

Species/River	Aripuanã		Roosevelt		Guariba		Manicoré		Total
	LB	RB	LB	RB	LB	RB	LB	RB	
<i>Ateles chameck</i>	1		2						3
<i>Callibella humilis</i>	6								6
<i>Callicebus bernhardi</i>	7						2		9
<i>Callicebus miltoni</i> sp. n.			2	3					5
<i>Chiropotes albinasus</i>	2		1	1				1	5
<i>Lagothrix cana</i>			2	1		1			4
<i>Mico chrysoleucus</i>		3							3
<i>Mico marcai</i>	5		4				4	5	18
<i>Mico intermedius</i>					3				3
<i>Pithecia irrorata</i>	3								3
<i>Saimiri ustus</i>	3						2	1	6
<i>Sapajus apella</i>	3			1	1		1		6

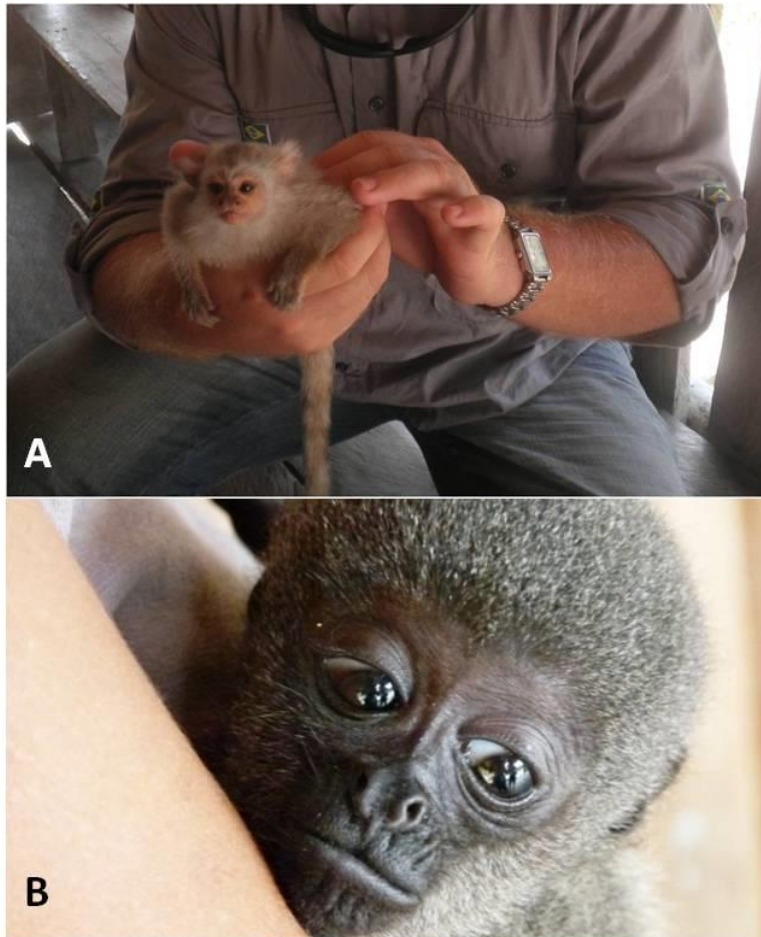


Figure 6 ó PET in MarmelosóAripuanã interfluve. A ó *Mico* sp.; B ó *Lagothrix cana*.

Achievements and Impacts

Our data on the *Mico marcai* presence in the wild is the first for this species since 1914 (Silva *et al.* 2013), figuring as the second documented record for this specie. In addition, we got the first data on the distribution of this species *in situ*, based on field work. Rylands & Silva Júnior (2008) also provided a map for *Mico marcai* distribution (IUCN 2014), but based only on the poor information about the neighboring species:

“Its range is unknown but probably extends south along the left bank of the Rio Roosevelt and at least part way north to meet, somewhere, the southern limits of the range of M. manicorensis. Ferrari (1993, 1994) reported the collection of an adult female “C. emiliae” on the east bank of the Rio dos Marmelos opposite the Tenharin Indian settlement (on the west bank, 07°57'S, 62°03'W). (For the correct location of Tenharin, see Ferrari 1994). Ferrari (1993) said it was easily distinguished from M. nigriceps (collected on the west bank at the same location) by the lack of pigmentation on the facial skin. It would seem that Ferrari (1993) presumed the identity of this animal to be C. emiliae based on Vivo (1985, 1991) who stated that C. emiliae occurred on the left (west) bank of the Rio Aripuanã: a belief arising from his interpretation of the identity of the marmoset of the Rio Castanho, here listed as Mico marcai (Alperin 1993). However, the true identity of the marmoset from the east bank of the Rio dos Marmelos at Tenharin has yet to be determined in light of this.

*Van Roosmalen et al. (2000) inadvertently indicated that Mico manicorensis occurred at the type locality of this species.*ö

Our survey and taxonomic assessments of the marmosets from Aripuanã River basin contribute substantially to the understanding of the taxonomic status and the distribution of *Mico marcai*. Moreover, this database can be used to plan the next steps for this species conservation. Recently, the Chico Mendes Institute, a Brazilian Government sector linked with Ministry of Environment, conducted the “I Workshop for Evaluation of Brazilian Primates” purposing to compile data on primate distribution and on the main threats to species conservation. This data is further applied to outline strategies for primate conservation and to implement the National Action Plan for Primate Conservation. Our results are a great contribution to the conservation of one of the less known Neotropical Primates.

Section 3:

Conclusion (max 250 words)

According to our preliminary assessment of the taxonomic status of Aripuanã Marmosets and based on the principle of priority of the International Code of Zoological nomenclature (ICZN 1999), *Mico manicorensis* (van Roosmalen *et al.* 2000) should be considered a junior synonymous of *Mico marcai* (Alperin 1993).

The distribution of *Mico marcai* is limited by the Aripuanã, Marmelos and Madeira rivers. The southern limit is the savanna vegetation of the ÕCampos Amazônicos National Park in the frontier of Amazonas and Mato Grosso State. However, the *Mico* species located in the south of this region remains unknown. We will conduct an Expedition to Mato Grosso to record the *Mico* species located between Ji-Paraná and Roosevelt interfluves.

The data present here is a significant contribution to understand the distribution patterns of one of the less studied group of Neotropical Primates: the Amazon's marmosets. Moreover, the Aripuanã River basin is a region where historically was ignore and neglected by the Science. The records of *Mico marcai* in the wild and the description of a new species of titi monkeys (*Callicebus miltoni* sp.n) is an example of this scenario (Dalponte et al 2014).

The Amazon's marmosets are not hunted for food, but are kept as PET. However, habitat loss is the main threat and should be the focus of a strategic plan for primate conservation in this region. The negative impacts on natural resources and on local human populations caused by the hydroelectric schemes in poorly studied forests, with high levels of biological diversity, must be disseminated.

Problems encountered and lessons learnt (max 500 words)

- Which project activities and outcomes went well and why?

We established an excellent network with research institutions in Brazil to keep our work with Amazonian marmosets in a long term. The distribution of *Mico marcai* is established and we are assessing its taxonomic status with the contribution of several researchers working with morphological and molecular parameters. We collected new data on primate diversity in the Aripuanã-Marmelos interfluvium and described a new species of titi monkeys (*Callicebus miltoni* sp. n; Dalponte *et al.* in press). These aspects were the most important contribution of our work to the Primatology and for primate conservation in Brazil.

- Please detail any problems that the project encountered or deviations from original project plans. Describe how these problems were addressed and what solutions were found to deal with these issues.

The most important difficulty was to meet the field expeditions schedule. We spent four months in 2013 to access the money from the Future Conservationist grant due to the bureaucratic process of the Brazilian Federal Bank. All the team found difficulties to adjust personal professional commitments with the project schedule. We then established a schedule of field expeditions and after-expeditions work that enabled all the team members to contribute in different ways. At the end of 2013 a local group of indigenous people and the illegal loggers clashed, originating several social conflicts in the region of Marmelos and Manicoré rivers. Due to the record high flood of Madeira River in the wet season of 2013/14, the access to the area was very difficult and the risk of tropical diseases as Malaria, Leptospirosis and Dengue fever was very high. We had to wait for months, until we could resume the field work in June and July of 2014.

- Briefly assess the specific project methodologies and conservation tools used.

We visited more localities than previously planned and collected more data on *Mico marcai* geographical distribution and on the local primate diversity at Marmelos-Aripuanã rivers interfluvium. Moreover, to visit more areas was important to get a broad view of the challenges for primate conservation in this

region and to establish contact in different areas of the *M. marcai* geographical range.

- Please state important lessons which have been learnt through the course of the project and provide recommendations for future enhancement or modification to the project activities and outcomes.

The partnership with different institutions and researchers is really important to consolidate the project in a long term. The study area is hard to reach and the support of the local government will enable to access some regions to be sampled next year. There are several factors that can influence the project schedule as we mentioned above. We will keep to plan carefully each expedition to minimize the influence of these factors and to keep the safety of the team. In addition we should be able to change the plans due to any kind of unexpected situation that may occur.

In the future (max 200 words)

We linked the project with Mamirauá Institute for Sustainable Development (IDSM) to get an institutional identity and we established a network with researchers from five institutions: University of Salford, Brasília Federal University, Amazonas Federal University, National Institute of Research on Amazon and Emilio Goeldi Museum. This network is important to implement the Marmosets Conservation and Monitoring Program (MCMP) in the MarmelosóAripuanã interfluve. The MCMP aims: (1) to collect data on population density of Marmosets, (2) to investigate the Taxonomy and the geographical barriers for dispersal on the genus *Mico* (3) to understand the PET activity through interviews with the local communities and with the people living in the small cities around the rural region and (4) to build and to strength the involvement of local communities with the project through educational activities in local schools, aiming the conservation of Aripuanã River basin primates.

Section 4

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Appendices

O SUPERINTENDENTE DE GESTÃO E ESTUDOS HIDROENERGÉTICOS DA AGÊNCIA NACIONAL DE ENERGIA ELÉTRICA – ANEEL, no uso das atribuições estabelecidas na Portaria nº 1.807, de 10 de maio de 2011, tendo em vista o disposto na Resolução Normativa ANEEL nº 393, de 4 de dezembro de 1998, e o que consta do Processo nºs 48500.001700/2006-58, resolve: I – Aprovar os Estudos de Inventário Hidrelétrico da Bacia Hidrográfica do Rio Aripuanã, sub-bacia 17, nos Estados do Mato Grosso, Rondônia e Amazonas, de titularidade da Empresa de Pesquisa Energética, inscrita no CNPJ sob o nº 06.977.747/0002-61. II – Informar que as recomendações contidas na Nota Técnica que subsidiou a aprovação do inventário hidrelétrico em tela devem obrigatoriamente ser atendidas na etapa subsequente de estudo.

Aproveitamento	Coordenadas Geográficas do Eixo do Barramento	Posição (Dist. da Foz) [km]	Área de Drenag. [km ²]	N.A máximo normal de montante [m]	N.A normal de jusante [m]	Potência Instalada de referência [MW]	Área do Reservatório [km ²]
Rio Aripuanã							
Ilha Três Quedas	10°13'19'' S 59°27'25'' W	820	15.168	245,00	215,70	115,50	341,20
Quebra Remo	9°07'03'' S 59°23'01'' W	633	31.825	105,00	77,60	267,80	233,50
Sumaúma	7°54'44'' S 60°11'48'' W	426	47.890	77,00	48,20	458,20	420,40
Prainha	7°13'41'' S 60°39'08'' W	300	131.006	48,00	26,50	796,40	262,90
Rio Roosevelt							
Ilha São Pedro	10°02'04'' S 60°37'28'' W	390	23.132	130,00	106,00	131,00	127,80
Inferminho	8°25'17'' S 60°57'35'' W	140	55.004	97,00	71,30	361,10	204,52
Cachoeira Galinha	7°42'19'' S 60°54'51'' W	33	59.122	70,00	48,10	399,80	230,60

Document 1 ó Document 1. Copy of the technical note from the Federal Agency of Electrical Energy of Brazil (ANEEL), approving the hydropower inventory studies on the Aripuanã River basin. Highlighted in the left column of the table, the name of the hydroelectric plants and, in the right column, the size of its reservoirs (km²).