Action Plan of the spider monkeys *Ateles hybridus* and *Ateles fusciceps* in Colombia

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1. Introduction

Primates are important for tropical forests, and they are key components in the evaluation strategies for biodiversity conservation for specific areas (Rylands et al., 1997). According to (IUCN, 2003) Colombian primates are under high human pressure resulting in the designation of one species as Critically Endangered (*Ateles hybridus*), one Endangered (*Saguinus oedipus*) and five Vulnerable (*Ateles belzebuth, Aotus lemurinus, Saguinus leocopus, Callicebus ornatus, Lagothrix lugens*).

In Colombia three species of *Ateles* have been identified: *A. belzebuth, A. hybridus* and *A. fusciceps* (Groves, 2001). The few studies focusing on *Ateles hybridus* and *A. fusciceps* in Colombia have concentrated mainly on phylogenetic relationships (Collins, 1999, Green, 1978, Scott et al., 1976, Struhsaker et al., 1975). No information about distribution of *A. geoffroyi gricescens* in Colombia is known to date (Defler, 2003), except one report from Juradó, very near to the

Panama border (Hernandez-Camacho and Cooper, 1976), and therefore the presence of *A. geoffroyi* in Colombia is still uncertain. *Ateles belzebuth* has been the subject of several investigations, including studies on dietary preferences and seed dispersal (Russo et al., 2003, Stevenson et al., 2002, Stevenson et al., 2000), social organization and fission-fusion behavior (Shimooka, 2003, Inaba, 2002, Izawa, 2002, Link, 2002, Shimooka, 2002, Didier, 1997, Ahumada, 1989) and ecological aspects such as home range size (Nishimura, 2002, Nishimura, 2001, Yoneda, 1988). *Ateles fusciceps* and *A. hybridus* have been identified as priority species for conservation requiring the formulation of conservation plans in Colombia. These species face threats such as habitat destruction and illegal hunting and they could become extinct rapidly (Procam-Inderena, 1986, IUCN, 2003, Rylands et al., 1997, Mittermeier et al., 1989, Collins, 1999).

In the biodiversity crisis that we are experiencing, it is important to establish priorities for conservation efforts and to allocate resources accordingly. Not enough information, time or financial resources are available to save all the species individually (Bibby, 1998). Combine ex-situ, in-situ and education projects it is necessary to protect these endangered species. **The** ***Ateles hybridus & Ateles fusciceps*** **Action Plan 2006-2010** is a start point to conservation of two Colombian endangered species.

Natural History

Taxonomy of *Ateles* is still in dispute, different research in morphology and genetics gives conflicting answers about the number of *Ateles* species (Froehlich

et al., 1991, Collins and Dunbach, 2000, Medeiros et al., 1997). For Colombia, *Ateles* has been recognized from one species (Hernandez-Camacho and Cooper, 1976) to three species (Groves, 2001). The only review for the complete genus, (Kellogg and Goldman, 1944) identified three species based on their pelage colors: *A. belzebuth* with two subspecies (*A. b. belzebuth* and *A. b. hybridus*), *A. fusciceps* with one subspecies (*A. f. robustus*) and *A. geoffroyi* with one subspecies (*A. g. grisescens*). This last species is recognized based on the type specimen from the British Museum.

Froehlich et al. (1991) made a morphometric cranial analysis of this genus using mainly animals from South America. The authors recognized great differences between *A. belzebuth* and *A. hybridus* and considered them to belong to different species. Additionally, they suggested that *A. hybridus* and *A. fusciceps* are subspecies of *A. geoffroyi*, as they found a specimen believed to be *A. geoffroyi grisescens* from the east of Panama that they suggest is a hybrid between *A. geofforyi* and *A. fusciceps*. This work shows small differences between *A. g. geoffroyi*, A. *g. robustus* and *A. fusciceps*, however there are only specimens from one locality for *A. geoffroyi* and *A. fusciceps.*

(Collins and Dunbach, 2000) used two regions of the mitochondrial genome to understand the phylogenetic structure of this genus. They suggest that in Colombia *A. hybridus* should be distinguished from other species. On the other

hand they suggest that *A. fusciceps robustus* and *A. geoffroyi*, belong to the same species but are different subspecies.

In another molecular study with Restriction Fragment Length Polymorphisms (RFLPs), Ruiz-Garcia and Alvarez (2002) suggested that *A. fusciceps* is a species with two different forms in Colombia (*A. f. robustus* and *A. f. rufiventris*). They also recognized *A. belzebuth* and *A. hybridus* as species.

Finally, Groves (2001) suggested three different species for Colombia after a revision of the research by Froehlich et al. (1991) and Medeiros, et al. (1997), recognized *A. hybridus*, *A. belzebuth* and *A. fusciceps* as different species following the phylogenetic species concept[1].

After a revision of all these academic approaches (Table 1), the number of species of Colombian *Ateles* is still unclear and needs to be resolved to take conservation actions and decisions about these species. However, for this action plan, I will follow the arrangement suggested by (Groves, 2001), because his comprehensive review of morphological, cytological and molecular genetic data led him to recognize the three morphotypes of Colombian *Ateles.*

[1] "Smallest aggregation of populations diagnosable by a unique combination of character states in comparable individuals" (Nixon and Wheeler 1990 cited in CLARIDGE, M. F., DAWAH, H. A. & WILSON, M. R. (1997) *Species: the units of biodiversity.,* London:, Chapman & Hall.)

Table 1. Academic approaches on the taxonomy of genus *Ateles* in Colombia.

Kellogg & Goldman (1944)	**(Froehlich et al., 1991))**	**(Collins and Dunbach, 2000))**	**(Ruiz-Garcia and Alvarez, 2002))**	**Groves (2001)**
Ateles fusciceps robustus	*Ateles geoffroyi*	*Ateles geoffroyi*	*Ateles fusciceps robustus* *A. f. rufiventris*	*Ateles fusciceps rufiventris*
Ateles belzebuth belzebuth	*Ateles belzebuth*		*Ateles belzebuth*	*Ateles belzebuth*
Ateles belzebuth hybridus		*Ateles hybridus*	*Ateles hybridus*	*Ateles hybridus*
Ateles geoffroyi grisescens				

Ateles hybridus

Description: Exhibits a brown back and whitish or cream in the underparts (including inner side of legs, arms and tail). Usually some individuals endowed with a triangular patch on the forehead (Defler, 2003, Groves, 2001).

Habitat: Found in evergreen, semi-deciduous, gallery, and dry forests up to 600 m (Defler, 2003).

[2] *Ateles hybridus*

Ateles fusciceps

Description: Body entirely black to brownish with a black or brownish head. Some individuals exhibit dark reddish underparts. Triangular patch

[2] Picture from Jan Vermeer

is not frequent (Defler, 2003, Groves, 2001, Rowe, 1996).

Habitat: Has been found in lowland to lower montane rain forest, semi-deciduous and deciduous forest (Rowe, 1996, Defler, 2003). [3]

Ateles fusciceps

Distribution

A lot of the distribution area for *Ateles hybridus* has been converted to agricultural lands or has been fragmented. *Ateles hybridus* is the species that has suffered more habitat destruction and a high reduction of its potential distribution area. This species is surrounded by a high number of human populations and this may be the reason for this high pressure. Only 9% of the potential distribution area remains as continuous forest for *Ateles hybridus*. This demonstrates the critical situation for this species in Colombia (Morales-Jiménez, 2004).

Most of the potential distribution area (64.19%) for *A. hybridus* is covered by agriculture (Morales-Jiménez, 2004). Obviously the two species have been affected by human activities such as agriculture. Other measures of threat for these species are the human population distribution and the presence of roads around the spider monkeys distribution areas. *Ateles hybridus* distribution area is most affected by human populations and roads, followed by *A. fusciceps.* *Ateles hybridus* is the species with the least remnant distribution area, only

[3] Author Picture: Antonio Ramírez Rodríguez, Picture from a captive animal in Santa Cruz Zoological Garden, Colombia

18.8% of the potential distribution area. Half of this area is continuous forest and the other half fragmented forest.

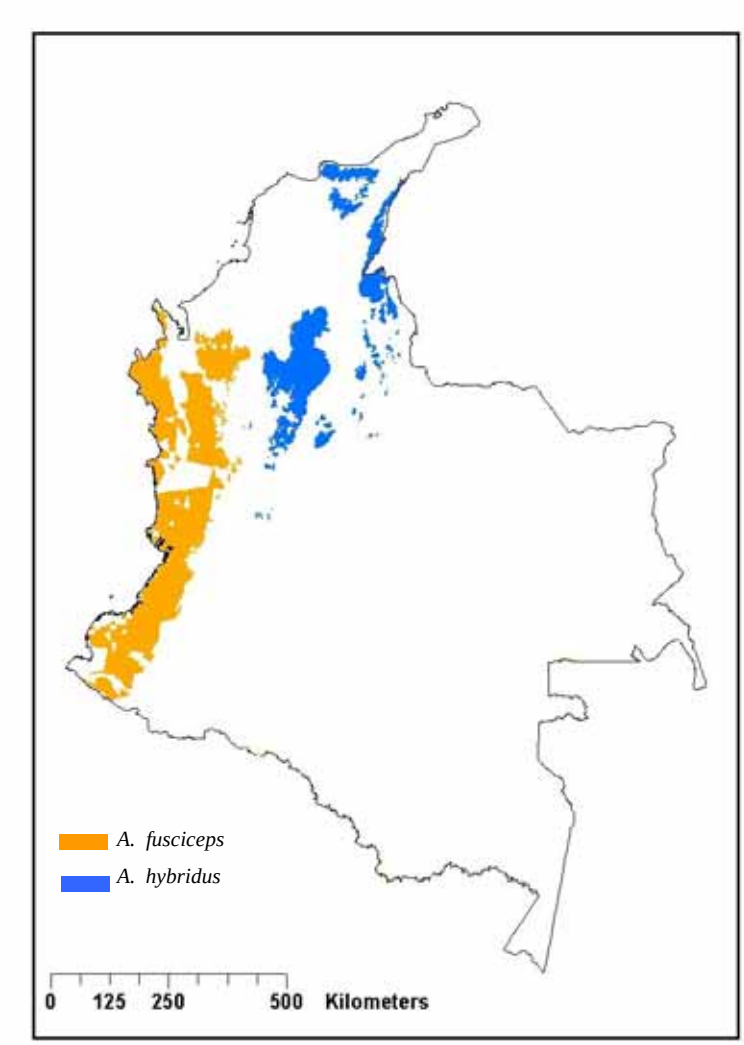

Figure 1. Remnant distributions of spider monkeys (*Ateles hybridus ans A. fusciceps*) in Colombia using GARP analysis. (Morales-Jiménez, 2004).

Threats in situ: Habitat destruction and hunting

In 2004, the distribution of genus *Ateles* in Colombia was modeled in order to find priority areas for conservation (Morales-Jiménez, 2004). The potential distribution area for *A. hybridus* was 164,364 km^2 and for *A. fusciceps* was 130,446 km^2. Only 18.8% of the potential distribution remains for *Ateles hybridus* and at least 56.9% for *A. fusciceps*.

Ateles hybridus distribution area is the least protected of all, only 0.67% of the remnant area is protected by National Parks. A lot of the potential area has been converted to agricultural lands or has been fragmented. *Ateles hybridus* is the species that has suffered most from habitat destruction, resulting in a large reduction of its potential distribution area. This species is surrounded by a high number of human populations and this may be the reason for its high level of threat. Only 9% of the potential distribution area remained as continuous forest for *Ateles hybridus* and this demonstrates the critical situation for this species in Colombia.

I received eight questionnaires with information about the species localities and its threats. Only one researcher had information about *Ateles fusciceps*, three about *A. hybridus* and four of *A. belzebuth*. Researchers evaluated the threats for the three species and they considered habitat destruction as the most significant threat (Morales-Jiménez, 2004). *Ateles hybridus* is affected by hunting too, while *A. fusciceps* could be more affected by the local war in its distribution area.

Ateles belzebuth is affected by hunting, infrastructure development and local war (Table 10).

Threats ex situ: Zoos and Rescue Centers

In Colombia *Ateles hybridus* is maintained in at least six zoos presenting problems of surplus animals and consanguinity (Table 1, Figure 1). On the other hand this species is suffering a lot from pet trade. There are around 40 individuals in four rescue centers (Table 2, Figure 2) that need to be re-located. To find options for these animals is a priority for this project.

Table 2. Number of animal per Zoo in Colombia, April 2005

Institution Zoo	**No. Total Animals** *A. hybridus*	**No. Animals F1** *A. hybridus*	**No. Total Animals** *A. fusciceps*	**No. Animals F1** *A. fusciceps*
Piscilago- Girardot	7	2	0	0
Matecaña – Pereira	4	2	21	7
Santacruz-Tequendama	6	2	7	2
Barranquilla Zoo-Barranquilla	10	4	11	6
Santa Fe-Medellin	11	4	9	6
Caimanes-Zoo-Monteria	1	0	0	0
Total	**39**	**14**	**48**	**21**

Figure 2. Enclosures from some of the Colombian zoos.

Table 3. Number of animal per rescue center in Colombia, April 2005

Institution Rescue Center	No. Animals *A. hybridus*	No Animals *A. fusciceps*
CAV-Medellín	10	12
Floralia-Cali	10	0
Corponor	2	0
CMDB	6	0
Total	28	12

Figure 3. Enclosure from one rescue center in Colombia

Ateles hybridus **&** *Ateles fusciceps* **Action Plan**

In-Situ Projects

1. Resolving the taxonomy of Colombian spider monkeys

As stated above, there have been several attempts to determine how many species of spider monkeys there are in the Colombian territory. As a part of a PhD dissertation on the definition of conservation units and phylogeny of the genus *Ateles* the uncertainty about which species live in Colombia will be resolved.

2. Identification of wild populations and estimation of densities of *A. hybridus* in Colombia (several localities).

It is important to verify the models generated by Morales-Jimenez (2004) to find the remnant populations for this species. The objective of this research is to identify forest areas where this species still occurs and to estimate the density of *A. hybridus* in those forests. Population status of *A. hybridus* is not known, and this is a priority research topic for conservation purposes. We will estimate the density of this species in at least three different localities, in order to know the state of the populations and how many individuals there are. It is important to monitor at least two of this areas (long term) to understand the demography of this species.

3. Identification of wild populations and estimation of densities of *Ateles fusciceps* (several localities)

There is no information about densities of this endangered species. The objective of this research is to identify forest areas where this species still occurs and to estimate the density of *A. fusciceps* in those forests. Population status of *A. fuscicpes* is not known, and this is a priority research topic for conservation purposes. We will estimate the density of this species in at least three different localities, in order to know the state of the populations and how many individuals are there.

4. Consolidation of a protected area for *Ateles hybridus bruneus*

Protected areas for this species exist but are not enough, and for the subspecies *A. hybridus bruneus* there is none a protected area. Habitat destruction and hunting take place in those regional protected areas. It is important to work with local communities to find alternative forms of using the forest and economic options to maintain themselves without destroying the forest and the animals that live there. It is important to identify how many regional and private protected areas exist for this sub-species and to evaluate problems in these areas to star working with their local communities.

4. Estimation of hunting and extraction of spider monkeys in their distribution area

It is important to estimate the quantities of extraction for these two species and the purpose of this extraction (for food or pets), in order to understand the way the communities relate with these species. After an estimation of these activities and the recognition of critical areas of hunting and extraction, it is necessary to understand the possible problems of those communities in order to find solutions for these threats.

Ex-situ Projects

1. Pedigree reconstruction from DNA analysis of Captive population of *Ateles hybridus* and A. *fusciceps.*

   It is important to reconstruct the relationships among animals between zoos and within them because information is very fragmented in Colombian zoo records. Apparently spider monkey groups started with few animals and now there are groups up to 20 individuals in the same enclosure that seem to be close related. We do not now how inbreeding they are and in order to manage a viable population this information is crucial.

2. Management of captive populations and breeding program of *Ateles hybridus* and *Ateles fusciceps* to maintain viable populations, including change of some habitats

   After finishing the studbook for Colombian spider monkeys is very important to manage this population to increase genetic variability. It is important to make interchange of animals between Colombian zoos and to manage reproduction. On the other hand, most of the enclosures are not appropriate for these animals and need to be changed or improved.

3. Evaluation of pet trade on *A. hybridus* and *A. fusciceps* and solutions for these animals.

   Spider monkeys are subject to pet trade and this is one cause of danger for these species. It is important to know where and when the animals are being extracted in order to educate human populations in the region and to give them alternatives for subsistence. This project will find the main areas involved in pet trade of *A. fusciceps* in order to focus efforts in education and alternatives for people. Interviews and visits to markets in towns around the distribution area will be made to identify the places more affected for this activity.

4. Reintroduction of *Ateles hybridus* and *Ateles fusciceps* in their natural habitat

   Reintroduction can be an important tool for conservation of an endangered species and to educate people around a flag-species. It is important to establish a reintroduction program for these species to: 1) evaluate this

management alternative for this species; 2) to give a solution for pet trade animals from these endangered species; 3) to increase public awareness around this species and the pet trade problem.

Education Project

1. Campaign: Knowing the spider monkeys

All zoos involved in this project will have education activities and material to let the people known more about this endangered species and the projects being implemented to preserve these species. Education is a very important element in conservation and public awareness is crucial in this process.

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