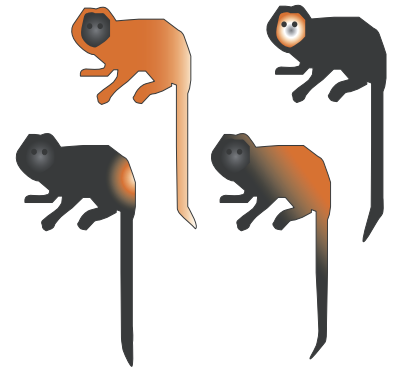


Tamarin tales

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Newsletter of the International Committee for the Conservation and Management of Lion Tamarins

On the (Zoo) Road with Devra and Denise

Devra Kleiman & Denise Rambaldi

Over a 2 week period, we visited 8 zoos to present the latest accomplishments and future challenges for golden lion tamarin conservation. From 16 June – 29 June 2008, we passed through the Atlanta airport 6 times on our way to and from zoos in the east and west of the US. The travel was provided by the Smithsonian National Zoological Park/ Friends of the National Zoo which had an agreement with AirTran and United Airlines. The purpose of this trip was to:

- re-establish close relations with GLT-holding zoos,
- develop ideas about raising money for in situ GLT conservation activities (and actually raise some money), and
- discuss and organize participants for a multi-institutional education proposal that would bring to North American zoos current events about GLT conservation and possibly could involve a comparison of family learning in Brazil vs the US.

Zoos visited included the Baltimore Aquarium, Zoo Atlanta, Disney's Animal Kingdom, Chicago Brookfield, Riverbanks (Columbia SC), Miami Metro Zoo, Monkey Jungle, and Los Angeles. In the middle of this marathon, we spent a day in DC with an evening fund-raiser in Bethesda, MD. By the second day of this voyage, we thought we would not be able to continue, but eventually we settled into a routine – most of which involved learning a new concourse in the Atlanta airport during every stopover (we especially recommend Concourse E). Devra had intended to take a walk every

morning, but threw her sneakers out before the end of the first week. Their odor was overpowering (and pretty horrible), after never quite drying out from being soaked in NE Argentina wetlands.

The zoos were generous in their support of our travel, typically providing overnight accommodations. Disney's Animal Kingdom Lodge was the most dramatic and we learned there that "having a magical day" would begin with a very expensive, albeit cheerful, breakfast.

We usually rented a car to make logistics easier, but with Devra driving and Denise directing, there were occasional mishaps, especially since Denise could not differentiate east from west, regardless of whether there



In December 2008, Denise was awarded the highly prestigious National Geographic Buffett Award
Photo: National Geographic Society

was sun or clouds. Denise believes that her inability to distinguish direction was due to a lack of sleep caused by the decibel level of Devra's snoring. Whether or not this is true, one thing is certain: Devra's snoring is significantly louder than Denise's!

And for those who might wonder, Denise can differentiate left from right!

The car rentals were curious. In one city, SUVs and trucks were the cheapest to rent; in another we got a very classy convertible, but during our visit, it either rained or was too hot to drive in the open air. We were both happy to see how positively the zoo community views the Golden Lion Tamarin Conservation Program. At every talk, we had between 30 and 50 staff members and docents who were enthusiastic, asked great questions, and were clearly pleased to be updated on what is happening with GLT conservation in Brazil. In our talks, we emphasized the need for meta-population monitoring and management as well as consolidation of the remaining Mata Atlántica forest landscape. It was clear that there is a desire and need for greater communication between Brazil and the zoos housing golden lion tamarins since this is the premiere program in which zoos have had a significant role in saving a species from extinction through captive breeding and reintroduction.

It was also a pleasure to see tamarins doing so well in the zoos. We saw the most brilliant coloration in the tamarins at Monkey Jungle, and tamarins eager to get out into their free-range exhibit in Atlanta and in the National Aquarium's Tropical Forest Exhibit in Baltimore. Brookfield had had free-ranging GLTs in the past and we discussed re-invigorating the exhibit again, with new graphics that focus on GLT *in situ* activities. The free-ranging GLTs were a very popular program at Brookfield and in fact, the last reintroduced tamarins came from Brookfield in 2000. Miami MetroZoo is just building a new free-range facility for golden lion tamarins, which should open sometime in December 2008.

We brain-stormed with education staff from Disney's Animal Kingdom, the National Aquarium, Riverbanks and Miami MetroZoo about developing a multi-institutional GLT informal education program for families that we could test in the US and Brazil. The

material developed could eventually be provided to all US and Brazilian zoos with GLTs and it would focus on educating parents and children simultaneously. The objective would be, of course, to change attitudes and behavior of families after a zoo visit. Disney's Animal Kingdom has already been supporting the education efforts of the Associação Mico Leão Dourado- AMLD (Golden Lion Tamarin Association) in Brazil.

Since Denise has never met a gift shop she did not like, Denise cheerfully helped support the failing US economy while we searched for golden lion tamarin items. The Monkey Jungle gift shop had the nicest primate items and was the only one where we found GLT items for sale. Monkey Jungle's Director had several good ideas for developing merchandise that could be sold.

At several institutions, we discussed the possibility of organizing an event, e.g. a Carnaval party, in February or March. In at least 2 zoos, there were AAZK (American Association of Zoo Keepers) chapters that did regularly have fund-raising activities and were interested in pursuing some activity to benefit golden lion tamarins in Brazil. We were especially keen to develop such events in cities with Brazilian Consulates and/or large Brazilian populations, and even more so in those southern cities that were reasonably warm in winter (it is difficult to dance samba on ice - we tried last year in Washington).

During our visit to Monkey Jungle, the Director agreed to sign the Conservation and Research Management Agreement (CRMA) and thus turn over all of their tamarins to the people of Brazil. In fact, Monkey Jungle was one of the first zoos to breed GLTs successfully in the 1970s and is the last zoo to still own golden lion tamarins. When Monkey Jungle signs the CRMA, it will mean that all golden lion tamarins will now belong to the Brazilian nation. In 1991, the GLT Conservation Program paved the way for other SSPs and EEPs to renounce ownership of endangered species in this ground-breaking effort.

On our final stop in Los Angeles we were able to visit with and thank Cindy and Cassidy Horn for their support in the purchase of the land that will become part of REBIO União (see article by Lou Ann Dietz). Denise was also able to do more shopping!

Denise and Devra were astonished that they could survive together for 2 full weeks without a significant difficult moment. There were, however, two minor “incidents”. Denise hates bananas and was offended when Devra ate a banana that they had carried in a bag for 3 days. Denise was even more concerned when Devra played a Brazilian CD (a gift from her son-in-law in the UK) with very energetic music; Devra was unaware (her Portuguese being insufficient to the task), but the lyrics were so completely pornographic that Denise was embarrassed by the music and said that the CD was likely banned in Brazil.

In December 2008, Denise was awarded the highly prestigious National Geographic Buffett Award for Conservation Leadership in Latin American Conservation.

I think that Ed Diebold’s comment sums up how we feel the zoo community responded to our “marathon beg-athon” and how they feel about the Golden Lion Tamarin Conservation Program in general:

“Thank you both for the outstanding staff presentation that you did about the Golden-lion tamarin program in Brazil. The GLT program was, many years ago, a ground breaking program in zoo conservation, and it remains so today. I have always admired the program a great deal and I know that our staff now has a better understanding and appreciation of your work.”

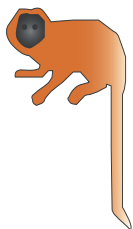
(Ed Diebold, Riverbanks Zoo, 30 June 2008)

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On the beginning of a field work with black-faced-lion tamarins in the Superagui National Park

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One of the few places where it is still possible to forget for a while that the once extremely rich and wide Brazilian Atlantic Rain Forest is now reduced to 7% of its original cover is Superagui Island, situated on the northern shore of the State of Paraná, Southern Brazil. This island is a paradisiacal place, where one can arrive and appreciate the latest sun rays coloring the Superagui channel in a unique way. Located inside an estuarine complex, Superagui Island, together with Peças, Pinheiro and Pinheirinho Islands, forms the Superagui National Park, a refuge of neotropical atlantic life. It is always instigating to admire the enormous green forest that extends so widely and deep that makes you wonder how many different species can be found in this place. Mammals, for example, are remarkably diverse, from the small rodents, marsupials and bats to the bigger species such as deers, tapirs, cougars, jaguars, small wild cats, otters, capuchin monkeys, howlers, and black-faced lion tamarins, just to name a few.

The black-faced lion tamarin (*Leontopithecus caissara* Lorini & Person 1990), which was discovered by scientists only by the end of the 1980’s, has a restricted distribution. So far they were only found in regions like Ariri, Rio dos Patos and Superagui Island, for which it was described. These animals are currently considered one of the most threatened primate species in the world, mainly because of its strict distribution, the very small estimated population size (ca. 300 individuals) and the lack of basic knowledge regarding its biology.

In order to contribute to a better understanding of this species, the team of the Laboratório de Biodiversidade, Conservação e Ecologia de Animais Silvestres of the Universidade Federal do Paraná arrived in Superagui Island in August, 2007 intending to find and study groups of black-faced lion tamarins that could be habituated and monitored. The first contact with local residents showed that most of them had already sighted the animals because a group of black-faced lion tamarin

is accustomed to approach the village in the fall and winter when they are fed with bananas. These animals had been seen getting off the trees and walking on the ground to enter in human habitations and markets. In one of these occasions, our crew had the first chance of seeing a group, formed by an adult couple and a young pup. On this particular occasion, we had the novel opportunity to witness a foraging association between the black-faced-lion tamarins and the blond-crested woodpecker *Celeus flavescens*. While the first ones were foraging for insects, the latter was following them, standing below and capturing the insects that had flown because of the monkeys' activity.

Although local people apparently do not represent a significant threat for the tamarins, the great number of domestic dogs may be pointed out as a potential cause of mortality. Furthermore, the lack of reasonable sanitary conditions in the surroundings of the village may allow the contact of human-transmitted diseases with these primates.

Despite the fact that the tamarins are easily seen on the village surroundings, finding and following groups inside the very dense forest turned out to be tough work. The soil is predominantly swampy so that tracking is done most of time with mud and water nearly up to our knees. When that difficulty is combined with long walks with unpleasant results, huge amounts of mosquitoes, ticks, blood-feeding flies and daily rains, it becomes an exhausting endeavor. Since the very first time we sighted the black-faced lion tamarins at the village, four months of intensive searches were done, albeit unsatisfactorily. Only in December 2007 did we find another black-faced lion tamarin group, at about three kilometers away from the village. This group was composed by three adult individuals and two twin infants. These animals were then followed while they fed on arthropods on the branches of native palms (*Syagrus romanzoffiana*) until the end of the day. Finally, we had a group that could be tracked and monitored. From now on, our most important goal was to capture an individual and fit it with a radio-collar, in order to readily allow its group localization in the forest. The beginning of 2008 was exhausting, as we had foreseen given our earlier field experiences. It took us eight days looking for the group we had selected for monitoring without finding a single evidence of its presence. Fortunately, we could finally locate it again,

but now it was composed of six individuals (a new pup had been recently born). As our trapping efforts had been unsuccessful (three Tomahawk traps baited with bananas), our next capture attempt would be capturing a specimen directly with our own hands. The plan consisted of following the group until they got into their sleeping tree hole, so that we could hand-capture an individual while the group was sleeping at night. Meanwhile, another question had been intriguing us: how could we follow these extremely fast animals in such a swampy and moody dense forest? Ever since we first sighted these primates, a genuine fascination emerged toward this beautiful, rare species with such an elaborated behavior, that prompted us to investigate their life histories in an intense way. Unfortunately, our plan to capture one individual from its sleeping tree hole failed because the hole was so deep that we could not reach a single tamarin individual.

In the next month, we had huge amounts of rainfall, just as predicted when February comes. In a few days in the field, among scorching sunny days and afternoon daily rains, we found the group and were saddened to know that the youngest pup had disappeared. Again, we did not get satisfactory results on trapping efforts. We then realized that the only way we could effectively capture an animal was picking it up from its sleeping hole, as we had planned. Although our previous attempts to capture an animal had failed, a positive result could already be evidenced: the group had habituated to our team, hardly ever reacting in a defensive way after being found by us. Finally, we managed to capture an individual from its tree hole at 4 AM in the morning, ensuring that next month we would involve data collection for the very first time.

Since April 2008, quantitative data is being collected in monthly seven-day field trips. Opportunistically, we could observe novel associations with birds, specifically with two other species: *Scitassomus griseicapilus* and *Dendrocincla turdina*. Besides, along the seven-day field trips we are systematically collecting data on black-faced lion tamarin diet, home range, habitat use, activity patterns, spacing patterns among group members, grooming relationships, plays, offspring care, mating, aggressiveness, and territorial behaviors. Along two months of monitoring, these animals used an area as wide as 45 hectares and slept in only two different tree holes. On two occasions we observed agonistic

interactions toward neighboring conspecifics. So far, the group fed on fruits, fungi, small vertebrates, and arthropods. Foraging activity takes place in diverse environments from 25-meter high canopy forests to flooded places with small and sparsely distributed *Syagrus* palms. With respect to the foraging micro-habitats, the group were frequently seen searching for prey in *Syagrus* palms branches, epiphytic and soil bromeliads, lianas, tree bark, and tree holes. All information is being collected in order to provide

quantitative data that we expect will reveal the details of the lives of black-faced-lion tamarins at this natural heritage called Superagui National Park. We believe that providing scientific knowledge is the first step towards assessing the current situation of this species in nature, the suitable conditions for its long-term survival and how to succeed in order to maintain populations apart from human-caused extinction threats and ensure their existence for many generations.

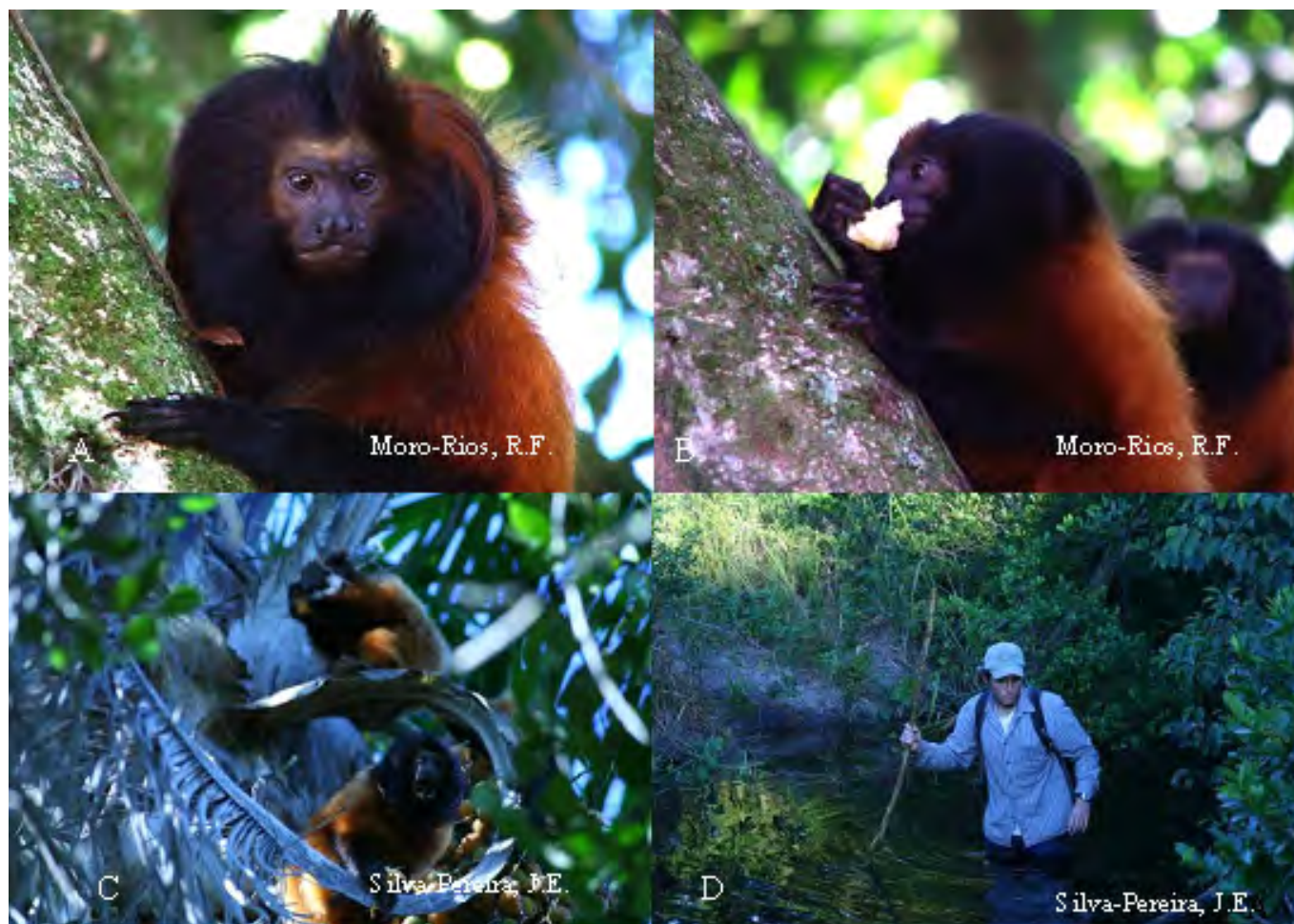


Figure 1. Black-faced lion tamarin at Superagui. (A) Adult animal. (B) Juvenil feeding. (C) Focal group eating *Syagrus* fruits. (D) Researcher walking into water during the monitoring.



A baby in my life

Cristiana Martins & Black lion tamarin field team

It was late afternoon, and I was at IPÊ's office in Nazaré Paulista, working in reports and other paperwork, when someone called me.

It was a guy from a private farm in Capão Bonito, a region where we are setting new initiatives for the black lion tamarin conservation program. He told me that they were working for a reforestation company inside a Eucalyptus plantation, when they found a little monkey baby screaming very loudly... They called some other colleagues, and one of them diagnosed – “It is a black lion tamarin, call the IPÊ's team, they know what to do with him!”

I was very surprised at the phone, it is not normal for this species to have captured animals, for pets or traffic, and I couldn't understand what a baby could do inside a Eucalyptus plantation. I asked him some things like the presence of other monkeys nearby, if the animal it was injured, if they could get him, etc. I told him to get the baby, and to put him in the farm, that we would go there.

I was lucky, Karla, the biologist of the program and our field assistants were at the region, monitoring another BLT group in some private farms. I tried as crazy to call her in her mobile, and after some hours I got her! She went with our field assistants to the farm, and called me with the news: it was really an infant (less than two months of age), and they decided to go to the forest fragment near the plantation to locate its group. They used play-backs to call other tamarins, and were successful in finding a group, but when they tried to put the baby with them, the tamarins refused him, letting him alone again. No other group it was located in the area.

The field team went back to the farm; in the meantime I was speaking with some vets to decide the baby diet, and called Karla again.

At this time, the baby had already a stuffed bear as a “mummy” and people were trying to offer him jaboticabas (a Brazilian native seasonal fruit). Oh, it was a female baby!

We decide to have a last tentative before to send her to the captivity. One of our monitored groups had babies and we came to the idea of trying to introduce her to

its group. We captured the whole group, and tried to put them together in a large enclosure inside the forest, but even if they do not refuse her presence, nor had agonistic behavior toward her, they didn't stay together. She was with the other baby at mom's back, but left after some seconds. She preferred to stay apart of the others.

Such a pity! We know that it is really difficult to introduce a new member in an established group, but at least we tried to maintain her in the field. As field biologists we know that she deserve that.

OK, but to maintain her life, it was time to send her to the captivity. I spoke with a biologist from São Paulo Zoo, which immediately took the providences to receive her at this place.

Kinha (her name now...) is now at São Paulo zoo, being very well monitored and with some “adopted” mummies from the nursery team.

Our team had a new experience (not really the one that we prefer to have), and could feel some different feelings, the ones that we have when we come close to an animal, when we are responsible for an puppy, when we have a life in our hands.

As field biologists, we do not use to feel that, even if our work means the same: to be close of the animals, to be responsible for them and to have their lives in our hands...



Walking with the monkeys....

Lilian Silva Catenacci

For two years and three days a week, I've been walking with the golden-headed lion tamarins in Una Biological Reserve, Bahia, Brazil. Well, that is, I follow the monkeys in the forest to see where they sleep, what they eat, where they defecate, if they meet other groups of tamarins or their nephews, like kuhli marmosets. Oh, I also watch how they fight, make love and even when they flee from their enemies, the predators. And, after so many hours with them, there are so many stories that I don't even know where to start. Did you know that monkeys sleep inside tree holes? They don't even make their own house but instead they use natural holes in trees or the shelter that other animals constructed. Once upon an afternoon, a group of lion tamarins was very agitated: they had chosen their place to sleep already, but only the oldest tamarin of the group had entered the tree hole, and came back out, screaming. They made a major racket in the entrance of the tree hole, and after about 10 minutes, I understood why: there was an owl inside the hole that the monkeys had chosen. And didn't they just expel the owl, which after all had arrived first, so that they could sleep in that place? Did they really have to choose the same sleeping site? They really are fussy...

And as soon as they wake up the next day, they start looking for food. Oh, but before they eat, they always have a good stretch, along with a few scratches on their tail or belly and defecate... and if you happen to be below them, you run the risk of winning their 'award' at 6.00h in the morning. Going back to the story of food and breakfast, the monkeys wake up with a terrible appetite, and frequently sleep close to a fruit tree. Indeed, these animals love fruits, but they also don't lose time when they see a beetle, cricket or cockroach. They hunt a lot, and since they are small, what they eat most are invertebrates. But don't mistake their ability...I already saw them taking bird eggs, as well as frogs and even small snakes. And when the hunting goes well, there generally is a big discussion on who gets the best bite. Generally, the infants win, more by merit of their screaming than for actually deserving the hunted. It's really great being able to observe all this from close by, without interfering... the monkeys above, and me on the forest floor, learning along with them.



Predation risk faced by golden-headed lion tamarins in cabruca agroforest.

Leonardo C. Oliveira & James M. Dietz

Cabruca agroforest refers to cocoa plantation with native forest overstory and it has been considered an important type of habitat for conservation of Atlantic Forest biodiversity in southern Bahia state, Brazil. Cabruca is the predominant vegetation type throughout the range of the golden-headed lion tamarin (GHLT), *Leontopithecus chrysomelas*. Although intact primary forest was long considered a requisite for the genus *Leontopithecus*, a recent study showed that GHLTs do use some types of degraded areas, including cabruca agroforest. Cabruca has lower density of trees (around 10%) and lower tree diversity compared to primary forest. These differences in forest composition and structure may affect the way GHLTs use it and their relationship with predators. Lower tree density may decrease canopy cover which may ultimately increase the degree of protection provided to small, arboreal primates. Another factor which may affect the susceptibility of primates to predation is the availability of sleeping sites. For GHLTs, tree holes are the most frequently used sleeping sites. In January 2008 we began a study to evaluate how GHLTs use cabruca agroforest. Four groups were captured and two of them use cabruca exclusively (so far).

While monitoring these two groups, our field team observed a high number of “encounters” between predators (raptors and mammals) and GHLTs. It is well known that mammalian carnivores and raptors are the principal predators for small primates and that arboreal primates are particularly vulnerable to raptors. Because predators avoid human observers, predation events per se are difficult to record. As an alternative to direct observation of predation, we decided to use the number of encounters with predators as a measure of predation risk. Here we report on the predation risk faced by two groups of GHLTs living in privately owned cabruca farms named Almada and Santa Rita. These farms are located in the municipality of Ilhéus, state of Bahia, contain around 120 ha of cabruca and are surrounded by other cocoa farms.

Study groups

The Almada group was first sighted on March 18th, 2008 and contained 12 individuals (10 adults and sub-adults and two infants aged around a month or so). The group was captured on April 18th 2008 and at that time it contained 9 individuals including one infant. The group Santa Rita was also sighted on March 18th, 2008. We saw a female with two infants and heard other tamarins vocalizing nearby. At the capture, five individuals were in the group including just one juvenile.

After standard examination, the groups were followed and observed for 15 full days starting when they left their sleeping site in the morning and continuing until they entered a sleeping site in the evening. All potential predators sighted were recorded, including the type of predator, the hour and its geographical position (UTM). We also took pictures for later identification.

Results

We recorded encounters with about 15 types of animals that could be considered potential predators of GHLTs, ten of which were identified to species level. Encounters with predators were more frequent in the Almada group than in the Santa Rita group.

Almada group

Raptors:

Leucopternis polionotus (Mantled Hawk), *Parabuteo unicinctus* (Harris's hawk), *Caracara plancus* (Southern Crested Caracara), *Buteo albonotatus* (Zone-tailed Hawk), *Buteogallus meridionalis* (Savanna Hawk)

Mammalian carnivores:

Eira barbara (Tayra), *Leopardus pardalis* (Ocelot)

Santa Rita group

Raptors:

Herpethotheres cachinans (Laughing Falcon), *Buteo magnirostris* (Roadside Hawk), *Milvago chimachima* (Yellow-headed Caracara)

Although we didn't directly observe any predation events, we did see many unsuccessful attacks on

GHLTs. In response to attacks, the tamarins used the alarm call and anti-predator strategies (jump to the floor when the predator was a raptor and go to the top of tree when the predator was a carnivore mammal). We also observed considerable changes in the composition of the groups in relatively short time span. Although we don't know exactly why some individuals disappeared from the groups, our preliminary results strongly suggest predation as an explanation.



From Brazil's population heartland: Pioneer in the Politics of Primate Conservation

Denise Rambaldi has achieved remarkable success in pulling a highly endangered primate species back from the brink of extinction in a complex and often conflictive region that is undergoing rapid change. She is doing so by using a highly effective mix of political savvy and passion for nature preservation to unite a broad spectrum of interest groups at all socio-economic levels to preserve the region's equally endangered habitat while promoting sustainable development. Her integrated "landscape" ecology approach has become a model throughout Brazil.

The organization she heads, the Golden Lion Tamarin Association, is located in a mixed rural-urban region about 100 kilometers northeast of Rio de Janeiro on the rapidly advancing edge of Brazil's population and industrial heartland. The endangered primate, the golden lion tamarin (*Leontopithecus rosalia*), lives in a restricted area of the Atlantic Forest, one of the world's most critically endangered biodiversity hotspots.

Although only 7 percent of the original forest remains, its patchwork of relatively intact areas and fragments contains levels of species diversity and endemism that rival much larger and more pristine regions.

Within this rapidly changing and highly stressed natural

environment, Denise has made major gains in ensuring the tamarin's survival by enormously expanding legal and effective protection, restoring forest areas and connecting forest fragments. Under Denise's guidance, the golden lion tamarin population now numbers about 1,500 animals and has been removed from the IUCN's Red List category of "Critically Endangered" (downgraded to "Endangered"). There are now tamarins in over 31 private ranches, and 2 Federal reserves totaling 10,600 protected (but not all connected) hectares.

Winning over landowners.

As part of her conservation strategy, Denise is making very effective use of this charismatic primate's public appeal to gain the support of landowners and local governments in habitat preservation and improvement. But not only is she winning converts for the tamarin; in the process she is bringing together traditional antagonists--for example large landowners and poor farmers belonging to the radical landless movement--into a partnership to achieve common interests.

As part of her success in forming alliances around conservation goals, Denise has been a powerful force in creating a local consortium to protect the São João watershed and plan at the landscape level in Rio de Janeiro state. Today, the entire watershed of 150,000 hectares is zoned as an "Environmental Protection Area," a federal conservation unit guaranteeing integrated land use planning for the entire region. Under Denise's leadership, many private landowners are now conserving remaining forest areas and dedicating their forest fragments as private reserves in what amounts to the largest private conservation effort in a single Brazilian state. In another striking achievement, a major publicity campaign organized by Denise in 1997 resulted in an agreement with the government to convert a large, publically owned area of potential tamarin habitat into the União Biological Reserve. And just last year, Denise and an international team were able to raise enough money to purchase a large privately held parcel of land that would serve as a crucial connection between the União reserve and neighboring forest fragments. Once again, Denise demonstrated her expertise in forming non-traditional collaborations and partnerships for conservation.

Helping local people.

Denise has also demonstrated how a conservation organization must become an advocate of local people to achieve its core objectives. In 2005 her association won an award from the Agrarian Development Ministry that recognized Denise's work with agrarian reform communities that settled near the tamarin reserves. Through an aggressive outreach program, the association achieved measureable results in lifting these settlers out of poverty while at the same time reducing their footprint within the Atlantic forest. Activities included helping the settlers establish and manage nursery production of tree seedlings that are being used in forest restoration and corridor creation. Similarly, Denise has initiated a program to train dozens of teachers in local municipalities and involve them in hundreds of projects and activities that promote environmental consciousness.

Additional successes under Denise's watch include:

- The participation of more than 100 rural properties in the management, restoration and protection of golden lion tamarins and their habitat.
- Training more than 250 students and professionals in conservation biology through the association's internship program. The results of the program have been disseminated in dozens of TV documentaries, including by Globo, BBC, National Geographic, Discovery, NHK, and Animal Planet, as well as national and international newspaper and magazine articles.
- A successful campaign in which the Brazilian people voted to have the golden lion tamarin appear on the Brazilian \$20 Real banknote and the issuance of a national commemorative stamp and postcards featuring the species.
- The creation of environmental education, forest restoration, and ecotourism programs by local municipalities.

Insistence on measurable goals

The golden lion tamarin conservation effort began with a managed zoo population in the 1970s, and subsequently evolved in the 1980s into an internationally-recognized scientifically-based reintroduction and translocation program with

the ultimate aim of protecting the tiny remaining forest fragments. Denise joined this program in 1989 as head of education. Within two years she was appointed Executive Director. Well before the international conservation movement began to focus on measurable goals and objectives, strategic planning, adaptive management, and cost-effectiveness, Denise coordinated an integrated approach to setting goals for the association using the best scientific information available, developing targeted actions, monitoring and evaluating effectiveness, and adjusting goals and strategies as knowledge increased and opportunities arose. Between 1984 and 2000, the association reintroduced and translocated nearly 200 golden lion tamarins mostly to forests on private ranches and to a government-owned ranch.

Denise's enthusiasm, expertise, energy and environmental policy skills are increasingly in demand within Brazil and overseas as national, regional and local governments develop environmental policies for preservation and management of endangered species and protected areas, for combating invasive species and for preparing for the effects of climate change. Rambaldi serves as a consultant to many governmental and non-governmental organizations and has been a major force in expanding the environmental NGO community in Brazil. She has a degree in forest engineering from the Federal University of Viçosa, a Bachelor of Law degree from Rio de Janeiro Metropolitan University and a Master's degree in Environmental Policy from Fluminense Federal University (UFF).

She was awarded the 1998 Muriqui Prize by the National Council of the Atlantic Forest Biosphere Reserve, UNESCO/Man and Biosphere Program. She is currently the council's vice-president. She also been awarded the Bruno Shubert Prize by the city of Frankfurt, Germany; a Medal of Merit by the Smithsonian's National Zoo; and the national conservation prize of the Ford Motor company. Perhaps most gratifying, Denise has received awards from local municipalities who know her personally for her environmental achievements and her success in turning mutually hostile groups into allies around a common conservation cause

Introduced marmosets in the GLT region: villains and victims

Carlos Ruiz-Miranda, Marcio Marcelo de Morais, Ursula Taveira, Andreia Martins

When you come to visit the golden lion tamarins (GLT), you may have an experience similar to the one I had when I first went to the field to observe reintroduced tamarins. I was looking up into the lower canopy with the GLT search image deeply rooted in my brain. I scanned the group, counted seven tamarins, and began to write down their behavior, the ethogram well-memorized. In the midst of writing down the behavior, I realized that I did not know what one of them was doing: it had behaved as if playing with an invisible monkey. I looked again, and again, until there it was, upside down prone with limbs spread-eagle against a tree trunk, hidden from me by my biased search image. I paused. The Reintroduction team observer beside me said: *mico-estrela*, and that is how I learned the common name for the common marmoset. It's funny how people that know, know that you don't know, by just looking at the way you are looking. I was watching a young golden lion tamarin playing with a subadult common marmoset. I said with diffidence "they are not from here are they?" The answer was: "they are here aren't they?" and that almost sums up the current state of affairs as to what to do with these marmosets.

Marmosets, of the genus *Callithrix*, have been introduced to the region where the golden lion tamarins live. These introductions are the direct result of the illegal wildlife trade within Brazil. Animals are caught in their native habitat as infants or young adults and transported to the big cities to satisfy both an internal and an international market. Tourists try to smuggle them out; one even tried to stash a monkey inside her hair! Truck drivers sometimes dump them by the side of the road. Rural and city dwellers release them into their farms or backyards. Sometimes law enforcement officers release them in nearby forests after they confiscate them from their owners.

In 1998, we started a project to find out if the presence of the marmosets was a problem for the conservation of the golden lion tamarins. Several questions have been

driving the project: Which species are present? Where do they come from? Is this a population expanding from the city of Rio de Janeiro? Do they form an established population? Do they compete for resources with the tamarins? Can they introduce disease into the area that would affect the tamarins? We began to study them the same way invasive species are studied. We have a small team of four people dedicated to this (see foto), with the extensive help from the Golden Lion Tamarin Association (Associação Mico Leão Dourado- AMLD) Reintroduction Team and its GIS lab.

The team has found several interesting pieces of information. First, the marmosets in this forest are a mixed bunch: some are common marmosets (*Callithrix jacchus*), some are black tufted-ear marmosets (*Callithrix penicillata*), and most of them are hybrids of these two species. We know they are hybrids by the pattern of hair and the coloration of the ear tufts and facial hair. It may be that some of the hybrids were formed in the area, but we have found new groups of hybrids and we have seen recently confiscated animals that are hybrids. So where do these hybrids come from? Who is releasing them?

We know these marmosets originated from the northeast and central Brazil and most probably from regions with severe deforestation. They are hidden amongst the cargo in trucks and in private vehicles. Through interviews we found out that there were 3 large releases (> 80 individuals) of confiscated marmosets in the region about two decades ago. These may have been the seed for some of the existing populations. However, there have also been recent releases of marmosets in some private forests, and these have been of small social groups.

Some of the marmosets are household pets. We wanted to know if the local citizens contribute to the problem of introduced marmosets and surveyed 600 local citizens in three municipalities. About 25% of the people said they had released wild animals into forests. About 3% of these said the animals released were marmosets. Most people thought that the released animals would do well after release. However, some people have released their very old and sick marmosets into forest so that they can have a dignified death. We have been doing an intensive

campaign through radio, television, written media and local talks to educate people to the perils of releasing wild animals acquired through the illegal wildlife trade. We also implemented a course for law enforcement officers of the region on the topic of invasive species and management and release of confiscated fauna and flora. We are concerned about captive animals, especially household pets, being released into the wild.

A survey of the distribution of the marmosets showed that they are present in almost the whole area of occurrence of the golden lion tamarins within the Sao João river basin, Rio de Janeiro. They are absent from the two biological reserves. But where the marmosets are present, they are abundant, more so than the tamarins themselves, which means that they are an issue for the reintroduced GLT population and for the wild population at the Serra dos Gaviões (see Map). The monitoring of forest fragments and the genetic studies carried out by Adriana Grativol suggest that the marmosets do not form an expanding population, but instead they are distributed into several isolated populations. They are limited by habitat fragmentation just as the golden lion tamarins are. But what will happen if we connect the habitat for the tamarins, as is planned?

Marmosets are not doing that well in some of the forest fragments. We have monitored over 12 groups and captured over 250 animals. Even though the hybrids reproduce, they seldom raise twins. Many of the animals had poor dentition, broken limbs, and wounds. The body weight is on the low side of the normal range. Over 30% had ectoparasites as opposed to 5% in the case of GLTs. Many had a large helminth infestation in their feces. We are concerned that unhealthy marmosets may facilitate the dispersion of disease.

The marmosets interact with the tamarins (see foto); more so in the smaller fragments where they can be in association for up to 65% of the observation time. Marmosets follow tamarins to the supplementation platforms, eat the bananas, eat from the same fruit trees, eat the same insects. In a study at the Rio Vermelho and Estreito farms, the tamarins showed aggressive behavior toward the marmosets and chased them away during the winter months. We did look for a positive benefit to the GLTs: the possibility that native GLTs

would follow marmosets to food sources, especially tree gum. But there was no evidence to support this idea. The marmosets defend their gum sites with strong determination. In all of the locations the young marmosets play with the young tamarins. It is lots of fun to watch. The preferred play is the reciprocal chase. Play fights occur too. Marmosets like to tug at the tails of the tamarins. Is all that play good for the tamarins? Is it bad? We don't know, but are concerned about all of this interaction and the potential for competition.

What should we do with these introduced marmosets? We do have concerns. We consider that they may increase the risk of a disease epidemic and compete with the tamarins for resources. We cannot count how much food the tamarins lose nor attribute any loss of tamarins to their presence. Marcio Morais is at Newcastle University working on modeling the effects of the marmosets on the tamarin populations. We hope to be able to put some probabilities on the risk of extinction of the tamarins with and without marmosets. We have been studying the marmosets as if they were an invasive species, but in fact they are not considered that. By Brazilian law they are Brazilian wildlife and thus protected. What about the hybrids? This issue is not in the law books. Local people like these marmosets. The feeling locally may be: "but aren't they lovely these villains?" Yet, people have begun to understand the issues; after the educational campaigns the AMLD received calls inquiring what to do with their marmosets.

Should we manage the marmosets? How so? These questions have been recurrent in the meetings of the International Committees for Conservation of *Leontopithecus* and *Callithrix*, and have been in the last two PHVA's. There is a consensus that intervention is due, but there are strong differences in opinion as to what needs to be done. The Ministry of the Environment is looking at this project as a model for what they should do with this issue nationwide. The options are to not intervene, to remove (then what?), to control through sterilizations. We feel as if we were walking on eggshells.

Whatever we do we must take into account conservation benefits and costs, and animal welfare. We have done experimental vasectomies on males to test the idea of

control by sterilization. It seems to work. In the six groups tried, there has not been a single birth in one year and the males recovered quickly from the incisions. But the procedure is expensive and difficult to do and we do not know if it is feasible for a large population. We could try chemical sterilization of females, but some are concerned about social conflict, expulsion and the welfare of these females. Lets also keep in mind that the population response to sterilization can take many years, during which there is still competition for resources and risks of disease.

Shall we remove marmosets? Especially so from the smaller fragments or from forests in which they are not doing well? We have permission to remove 130 marmosets. What shall we do with the removed animals? Should we treat hybrids and non-hybrids differently? Do we need more information? When is the information enough to engage in action? Shall we invoke the precautionary principle and act now? YES! There are tools at our disposal. We used the IUCN guidelines for primate reintroductions and confiscated animals to develop a decision-making tree that has for its guiding principle the Conservation of Biodiversity and adopts animal welfare as a tool of the trade. These are some of the main issues we have been thinking about to deal with these victims of the illegal wildlife trade, villains in their new land.

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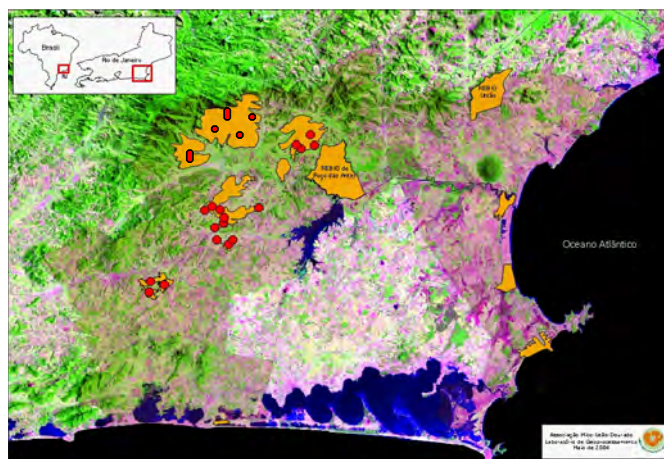
Reintroduction team field corodinator



The introduced marmoset team of 2006-2008: Marcio Morais, Ursula Taveira and Jonas. Photo by Carlos Ruiz-Miranda at Fazenda Boa Esperanza.



Introduced marmoset interacting with a golden lion tamarin over a piece of banana. Notice the ear tufts of this animal: it is a hybrid with tuft shape like a *C penicillata* and coloration of a *C jacchus*. Photo by Mauricio Dias.



Map of the current distribution of the introduced marmosets in the São João river watershed. The red circles represent the locations where marmosets have been captured and observed. The yellow areas are populations of golden lion tamarins.

Lion Tamarins of Brazil Fund – an update

Bengt Holst, Copenhagen Zoo, co-custodian of the LTBF

From 2007 to 2008 the Lion Tamarins of Brazil Fund received a total of 129.130 US\$. The money was received from our true supporters and from new institutions that have chosen to support the conservation activities for the four species of Lion Tamarins. Some of the money was earmarked to specific species in the framework of “adopt a group” arrangements that so far includes five European zoos. Each zoo contributes an amount of at least 5.000 US\$ a year to a specific conservation programme and receives in exchange regular reports from the field that they can use in their conservation interpretation activities in the zoo. The reports are very popular with the zoo visitors and provide a good feeling of what is going on in the forest where the Lion Tamarins live. From the field project point of view the money is essential for their activities, and they can use the zoos as windows to the outer world – exactly in the same way that the zoos can use the field projects as a window to nature. We have thus created a win-win situation that we can all be proud of. During the same period an amount of 169.598 US\$ has been awarded to various Lion Tamarin field projects in Brazil in accordance with the decision made by the International Committee for Conservation and Management (ICCM) of the Lion Tamarin Species in 2005:

“It is recommended that the present amount together with the current income is spent in support of the implementation of the new Conservation Action plan down to 50.000 US\$ within the next 5 years. Integrated projects in support of all four species have priority. The remaining 50.000 US\$ is to be kept as an “emergency fund” to be used in urgent matters only. In case an endowment fund can be established, the remaining amount after 5 years must be included in that fund. Approved by the ICCM 14 June 2005”

The Lion Tamarins of Brazil Fund awards are divided into LTBF small grants (up to 5.000 US\$) and LTBF large grants (up to 20.000 US\$) as described below:

“Two sorts of funds will be available:

a) Up to 20.000 US\$ a year for bigger projects relating

directly to action points in the recommendations of the 2005 PHVA. These funds can be provided for no more than 2 years in a row, and will be coordinated by the LTBF team (four species coordinators, two co-custodians of the LTBF and one representative of IBAMA).

b) Up to 5.000 US\$ per year per species, prioritised by the species coordinators. This part will be used for the next 3 years after which it will be evaluated.

Approved by the ICCM 25 May 2006”

The following large grants were awarded from 2007 to 2008:

Establishment of a Golden-headed Lion Tamarin consortium II:	20.000 US\$
Bridging gaps: forest corridors for the metapopulation management of black lion tamarins (<i>Leontopithecus chrysopygus</i>)	20.000 US\$
Black-faced Lion Tamarin Conservation Program: implementing Action Plan through filling data gaps	20.000 US\$
Action steps to implement AMLD’s Golden-headed Lion Tamarin Metapopulation Management Plan	20.000 US\$
Filling gaps on the Black Lion Tamarin Metapopulation Program	20.000 US\$
Continuation of detailed monitoring of the Poço das Antas population of Golden Lion Tamarins for 6 months	20.000 US\$
Survey of golden-headed lion tamarin (<i>Leontopithecus chrysomelas</i>) introduced in Niterói, RJ.	21.000 US\$

In addition to these awards two awards were provided from the emergency fund:

For further information about these projects please refer to www.ltbfb.org – the newly established home page of the Lion Tamarins of Brazil Fund.

I would like to use this opportunity to thank all contributors during the years to make this possible. Together the many donors not only constitute the financial basis of the Lion Tamarins of Brazil Fund, but they are also a standing proof of the dedication of zoos to conservation of the four Lion Tamarin species. It is my sincere hope that the support will continue in the coming years. Conservation is a question of long term commitment, and a loyal group of supporters is the best one can wish for serious conservation projects. I thus want to thank all institutions and single persons cordially who have contributed to the Lion Tamarins of Brazil Fund during the reporting period. A special thank to those who have indicated to continue their valuable support also in the years to come. All contributions, big and small, are most appreciated and are earmarked for field projects supporting Lion Tamarin conservation.

From 2007 till 2008 the following institutions have contributed to the Lion Tamarins of Brazil Fund:

Donations Larger than \$10,000

Dublin Zoo, Ireland
Colchester Zoo, UK
Copenhagen Zoo, Denmark

Donations \$5,000 to \$10,000

Chester Zoo, UK
Zoological Society of London, UK

Donations \$500 to \$5,000

SECAS, France
Woodland Park Zoo, USA
Baton Rouge Zoo, USA
Zoo Doué la Fontaine, France
Hogle Zoo, USA
Rio Grande Zoo, USA
Rosamond Gifford Zoo, USA
Marwell Zoo, UK
Rare Species Conservatory Foundation, USA
Krefeld Zoo, Germany

Zoo de la Palmyre, France
Saitama Children's Zoo, Japan
Brandywine Zoo, USA
Dallas World Aquarium, USA
Denver Zoological Foundation, Inc., USA
Santa Ana Zoo, USA
Crystal Gardens, USA
Lisbon Zoo, Portugal
Basel Zoo, Switzerland
Beardsley Zoological Gardens, USA
Lowry Park Zoo, USA
Milwaukee County Zoo, USA
Oklahoma City Zoo, USA
Palm Beach Zoo, USA
Sedgwick County Zoo, USA
Southern Ontario AAZK Chapter
Trevor Zoo and SCAPE, USA
Wildlife World Zoo, USA

Donations Less than \$500

Wuppertal Zoo, Germany
Falmouth High School, Mass., USA
Jeremy Mallinson, Jersey
Bob and Lil Preston, USA
Oregon Zoo Foundation, USA
Scoville Zoo, USA
Fordline Latchkey School, USA
Bramble Park Zoo, USA
Andrew Preston, USA
Addy Stupin, USA



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Written Contributions to Tamarin Tales are Welcome

