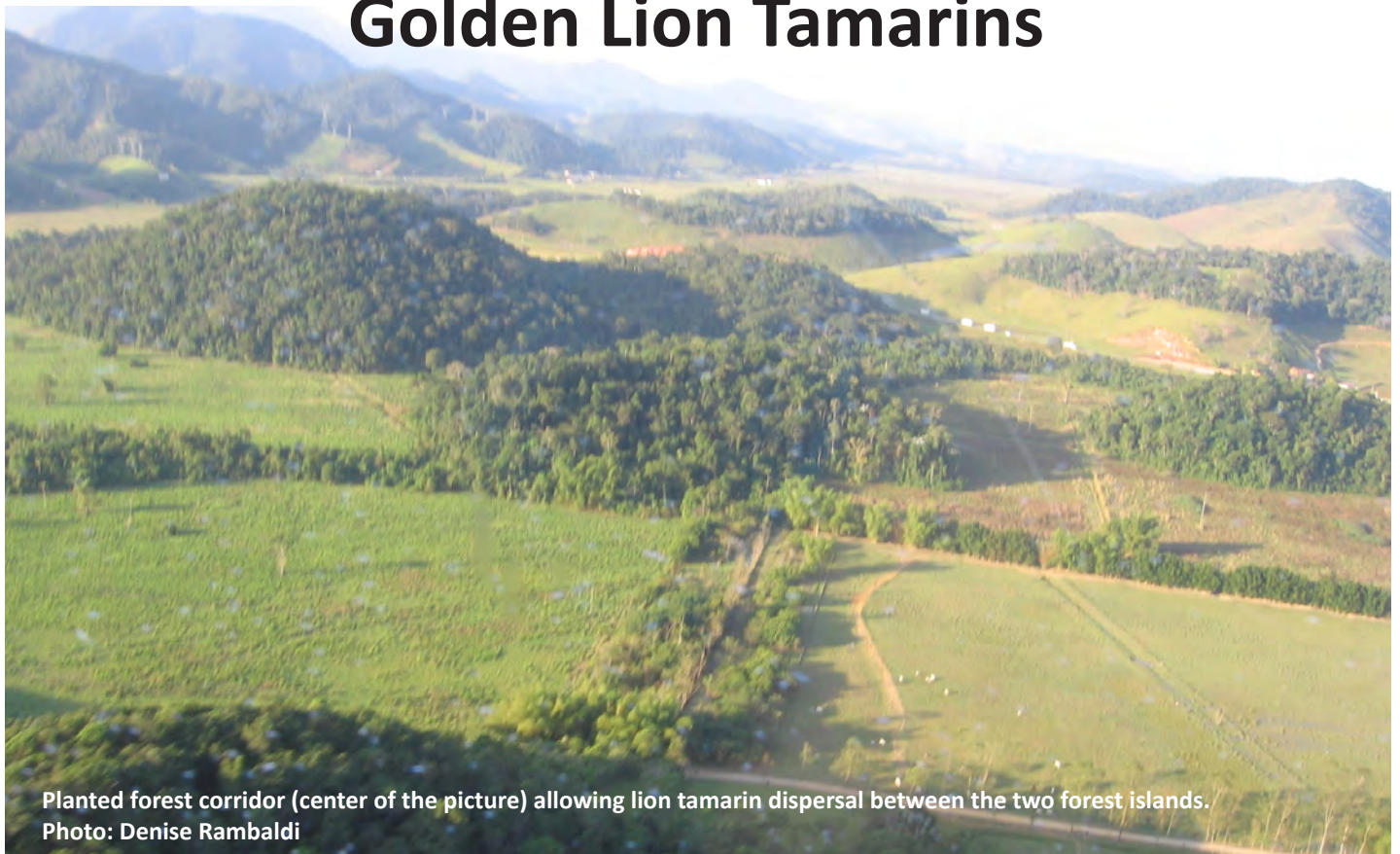


Metapopulation Management of Golden Lion Tamarins



Planted forest corridor (center of the picture) allowing lion tamarin dispersal between the two forest islands.
Photo: Denise Rambaldi

Denise M. Rambaldi, Executive Secretary, Associação Mico Leão Dourado
Carlos R. Ruiz-Miranda, Universidade Estadual do Norte Fluminense
James M. Dietz, University of Maryland

Golden lion tamarins (GLTs) are native to remaining fragments of Brazil's Atlantic Forest in Rio de Janeiro state. This region of Brazil was the first to be colonized and has since developed into the agricultural, industrial and population center of the country. With less than 2% remaining in lowland forest, this is one of the world's most endangered biodiversity hotspots. In 1992, a Brazilian non-profit organization, Associação Mico Leão Dourado (AMLD; www.micoleao.org.br), was created to

conserve GLTs, their Atlantic Forest habitat, and many other endangered species found therein. AMLD has been remarkably successful in carrying out field efforts to achieve its conservation goals. Thanks to its successful reintroduction and translocation programs, the creation of 29 privately owned local conservation reserves and a federal Biological Reserve, the number of GLTs in the wild has increased from a few hundred to about 1,600, and protected habitat has increased by 140%. In 2003,

the IUCN Red Data Book status for GLTs was changed from “critically endangered” to “endangered” the first of only two cases of a conservation upgrade for a primate. Despite this success, there is still lots to do to ensure the long-term survival of the species.

Three international Population and Habitat Viability Analyses identified an attainable conservation goal: to ensure species survival we need at least 2,000 golden lion tamarins living freely in a landscape of at least 25,000 ha of connected and protected Atlantic Forest habitat. We have come a long way toward achieving that goal. AMLD now monitors and manages about 73% of the number of tamarins necessary to ensure the long-term survival of the species. Unfortunately, none of the GLT populations in existing forest islands are large enough to persist on the long term. GLTs are distributed in a “metapopulation” which consists of tamarins living in 18 isolated forest habitat patches, each surrounded by cattle

pasture or agricultural fields, land cover that GLTs can’t cross. These small and isolated populations suffer from low genetic diversity and lack gene flow, which results in inbreeding and increased probability of extinctions. These threats can be removed by facilitating GLT dispersal among isolated populations, either by translocating tamarins or by planting forest corridors to connect forest fragments. AMLD is doing both in the first-ever metapopulation management program to conserve an endangered species. Following are the steps in this innovative conservation program.

Identify the GLT metapopulation management area and monitor habitat size and quality

AMLD maintains a team of skilled geographers and a state-of-the-art GIS laboratory. During a workshop held in January 2009, these technicians used remote-sensed satellite data, landscape analysis and site visits to identify the largest remaining fragments of habitat suitable for tamarins and that are located close enough to allow connection by forest corridors, i.e. the GLT *metapopulation management area* (MMA). The management area includes the seven largest remaining forest patches, a total of 39,054 hectares of forest.

Monitor the number of GLTs in each forest fragment in the MMA

Conservation of GLTs requires accurate information on the number of individuals and reproductive groups found in each habitat fragment, data that are difficult to come by for monkeys that are small, shy and sparsely distributed in thick forest. AMLD wildlife managers use several methods to keep track of tamarin numbers. Tamarins in a few “keystone” populations are followed continuously over many years. These intensively studied

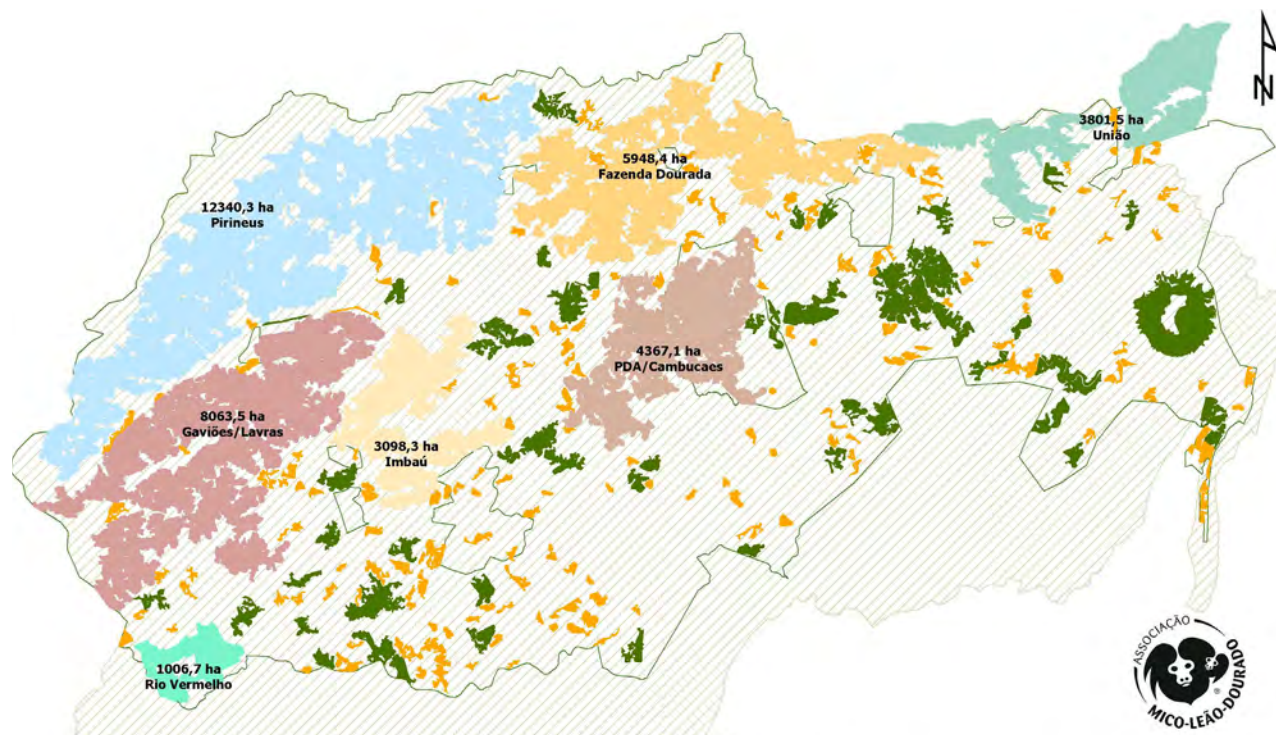
GLTs are individually marked, habituated to the presence of human observers and (thanks to support from Lion Tamarins of Brazil Fund!) carry radiotelemetry transmitters. Long-term mapping of GLT home ranges provides accurate measures of tamarin densities in various kinds of forest habitats, information that is used to estimate tamarin numbers in less-closely monitored populations.

In addition to information on tamarin density and distribution, monitoring also provides information on local threats such as disease and hunting. Finally, AMLD geneticists and population planners use molecular-genetic techniques and pedigree analysis to evaluate the extent of gene flow among the isolated tamarin populations and recommend translocation strategies.

Effectively protect the forests in the MMA

AMLD director Denise Rambaldi and her staff live and work in the region and maintain excellent relations with local landowners. In fact, the majority of AMLD members are local landowners and their families. This positive relationship has been developed and nurtured for decades and is the key to the Association’s success in conserving existing forest habitat. To date, the Association has worked with landowners to create 29 Private Conservation Reserves (RPPN—comparable to conservation easements in the U.S. and conservation covenants in Europe) comprising 2,650 ha, the largest concentration of RPPNs surrounding a public Reserve in any state in Brazil. The Association works with the local public in other ways, including formal education

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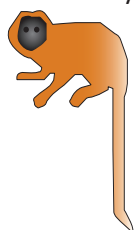


Current geographic distribution of golden lion tamarins, 100km northeast of Rio de Janeiro city. The colored polygons represent all remaining lowland forest fragments larger than 50 ha. When connected by forest corridors being planted by AMLD, and if tamarin densities match predictions, the seven largest fragments will result in a single metapopulation that has a high probability of long-term survival.

at academic levels from grade school through graduate research, training in sustainable economic activities (for example, raising and marketing tree seedlings used in planting forest corridors, ecotourism), public relations and media campaigns, and training of teachers and local leaders. AMLD maintains fruitful collaborations with legislators, donors, law enforcement agencies, foreign and Brazilian researchers, media liaisons as well as other conservation organizations and federal and local government agencies. Two decades of extension work, community education and political activism has stopped virtually all illegal deforestation in the region as well as illegal capture of GLTs for the pet trade.

Plant forest corridors linking the seven large forests in the MMA

Restoring habitat, planting forest corridors and improving degraded areas surrounding suitable forests can foster successful dispersal of tamarins among forest islands, the lifeblood of a metapopulation's survival. To date, AMLD foresters have planted 24 corridors connecting more than 10,000 ha of forest patches. These corridors, all on privately owned land, begin with conversations with landowners. The "costs" of corridors, such as pasture land converted to a corridor, have to be reconciled with "gains", which



may include watching a family of reintroduced tamarins in the owner's backyard and contributing to saving the species. AMLD foresters typically plant corridors with fast-growing native trees and bushes. These thin stands are quickly colonized by birds and bats that disseminate seeds in their feces. After several years the corridor begins to resemble native forest and permits tamarin dispersal. In rare cases the Association facilitates land purchase for conservation. For example, in 2007 AMLD worked with Saving Species (www.savingspecies.org) and IUCN-Netherlands to purchase a small cattle pasture that separated a biological reserve containing GLTs from a large tract of coastal mountain forest to the west. The purchased land was immediately donated to the Brazilian government, annexed to the União Biological Reserve and planted in native tree species.

Manage GLTs in the wild

The establishment of a self-sustaining and healthy captive population of GLTs in the early 1970s made possible the reintroduction of captive-born GLTs into native Brazilian forest. Since 1984, AMLD biologists released 147 captive-born tamarins into small, privately owned forests in the region. GLT reintroductions involved extensive pre-release preparation, and post-release provisioning, management and veterinary support to maximize survival and reproduction. Reintroduced tamarins and

their descendents now number about 750, 50% of the wild population. Tamarins in these small, privately owned forests are highlights in AMLD's ecotourism program. Proceeds benefit the land owners and help support AMLD's conservation efforts in the region. AMLD manages these very small populations by translocating individuals among the forest islands, as is done for managed species in zoos worldwide. In 1994, AMLD researchers translocated 42 tamarins into protected habitat devoid of tamarins. These GLTs were rescued from forests that were being cut or threatened in other ways and the population has since expanded to 250 individuals. In 1998, the area receiving the translocated tamarins was transformed into a Federal Biological Reserve.

Why your support is important

AMLD has the knowledge base, the people and the commitment necessary to achieve our long-term goals. Although the Association has funding for other aspects, we lack sufficient support to continue to monitor the wild population of tamarins - especially as it increases in size. Continuous monitoring is essential for evaluating our progress in achieving our goals as well as guiding our actions. The seven AMLD wildlife managers are local residents with 10-25 years experience in collection of field data on the ecology, behavior and demography of dozens of breeding groups of GLTs. They are skilled in use of radiotelemetry and GPS, and in orienteering, translocation and census techniques. AMLD wildlife managers also evaluate the use of forest corridors by GLTs and their success or failure in dispersal. In addition to information on tamarin numbers, monitoring also provides information on local threats such as disease and hunting. If AMLD is able to secure funding to allow its team of seven wildlife managers to monitor and manage the wild population, we can and will conserve golden lion tamarins in perpetuity and protect over 25,000 ha of Atlantic Forest and the biodiversity it contains.



Fragmented landscape typical of the current geographic distribution of GLTs.



AMLD Extension Coordinator teaches a local landowner to produce and market tree seedlings used in AMLD forest corridors and in reforestation.



AMLD wildlife manager teaches a local landowner how to use radiotelemetry to locate GLTs reintroduced on his property.

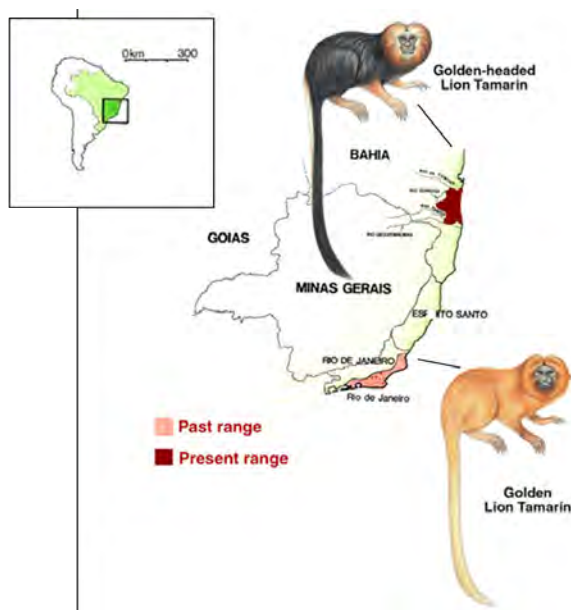
Invasive introduced golden-headed lion tamarins

- a new threat to golden lion tamarins

Maria Cecília Martins Kierulff, Instituto Pri-Matas

The problem

Leontopithecus chrysomelas (golden-headed lion tamarin) is restricted to the Atlantic Forest of southeast of Bahia and the extreme northeast of Minas Gerais. The species is classified as Endangered in the IUCN/SSC Red List and in the Brazilian Red list.



Original distribution of golden-headed lion tamarin and golden lion tamarin.

In 2002 individuals *L. chrysomelas* were observed for the first time in a forest fragment, part of the Serra da Tiririca, within the city limits of Niterói, RJ (Fig. 2). Golden-headed lion tamarins do not occur naturally in Rio de Janeiro, area of distribution of *Leontopithecus rosalia* (golden lion tamarin), and they were released by accident by a private collector. The presence of this large and growing number of lion tamarins is a threat to the survival of the golden lion tamarins that live in the neighboring areas.

To know the dimension of the problem, in 2009 we conducted a survey of golden-headed lion tamarins in the forests of Niterói, RJ. The research was funded by the LTBF (Lion Tamarin of Brazil Fund.) We used play-backs to attract and to count the individuals. During the survey we found 15 groups (107 individuals). Adults carrying very young offspring were observed at the end of April (in the wild population the birth season ends at March). The local residents feed the *L. chrysomelas* that live in the forests near to their houses which may account for the large group sizes observed.

Currently, the groups of golden-headed lion tamarins are restricted to the forest in the municipalities of Niterói, Maricá and São Gonçalo (Fig. 3). The nearest population of golden lion tamarins, however, is located in Fazenda Rio Vermelho, municipality of Rio Bonito, less than 50 km from Niterói.

The golden lion tamarin (*Leontopithecus rosalia*) occurs only in small and isolated fragments of the Atlantic Forest in a restricted region of the lowlands of the state of Rio de Janeiro (Fig. 1). It is categorized as "Endangered" on the IUCN Red List of Threatened Species, and on the Official Brazilian List of Endangered Species. The introduction and invasion of exotic golden-headed lion tamarins within its geographic range represents a serious threat to its survival. The chances are high that the two species will hybridize, with foreseeable disastrous consequences for the golden lion tamarin, and all the efforts that have been made over the years for its protection and conservation. There are risks too that the golden-headed lion tamarins, otherwise naturally occurring far to the north in the state of Bahia, will introduce diseases previously absent from the region.

For all the reasons above the rescue and removal of the population of golden-headed lion tamarins in Niterói is crucial and urgent.

Next steps

Due to the serious threat presented by the golden-headed lion tamarins in Niterói, actions to remove them are urgent. The invasive *L. chrysomelas* population is expanding more every year and they need to be captured and removed as soon as possible before removal becomes impossible. The best solution would be to capture and translocate these golden-head lion tamarin groups back to Bahia.

We recommend capturing the introduced groups and their descendents over a short period of time, before the population grows to a size which makes it difficult or even impossible to control. They could then be released in a forest in Bahia located within the species distribution and without or with few native golden-headed lion tamarins (GHLTs). The area has to be big enough for all groups or the translocated GHLTs will need to be released in more than one forest.

The capture and relocation of the groups should be carried out in partnership with the Instituto Chico Mendes/Ibama, NGOs and the local community of Niterói, São Gonçalo and Maricá. And the release should

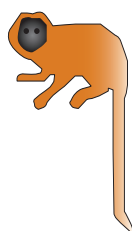
be done in partnership with landowners and the local community in Bahia.

The forest where the golden-headed lion tamarins were introduced covers more than 4,000 hectares and is well preserved. That the golden headed lion tamarins are thriving there indicates that resources are evidently sufficient for them. One of the biggest problems for the conservation of the golden lion tamarin today is the lack of suitable habitat, and the few remaining fragments available for their reintroduction are small and degraded. Subsequent to the capture and transfer of the *L. chrysomelas* from Niterói, and once it is clear that no *L. chrysomelas* remain, we believe that groups of golden lion tamarins could be reintroduced into the area. The reintroduction of *L. rosalia* in this region will contribute to increasing the number of animals in the wild.

View of the State Park of Serra da Tiririca and Darcy Ribeiro Municipal Reserve where the golden-headed lion tamarins are living in Niteroi, RJ.



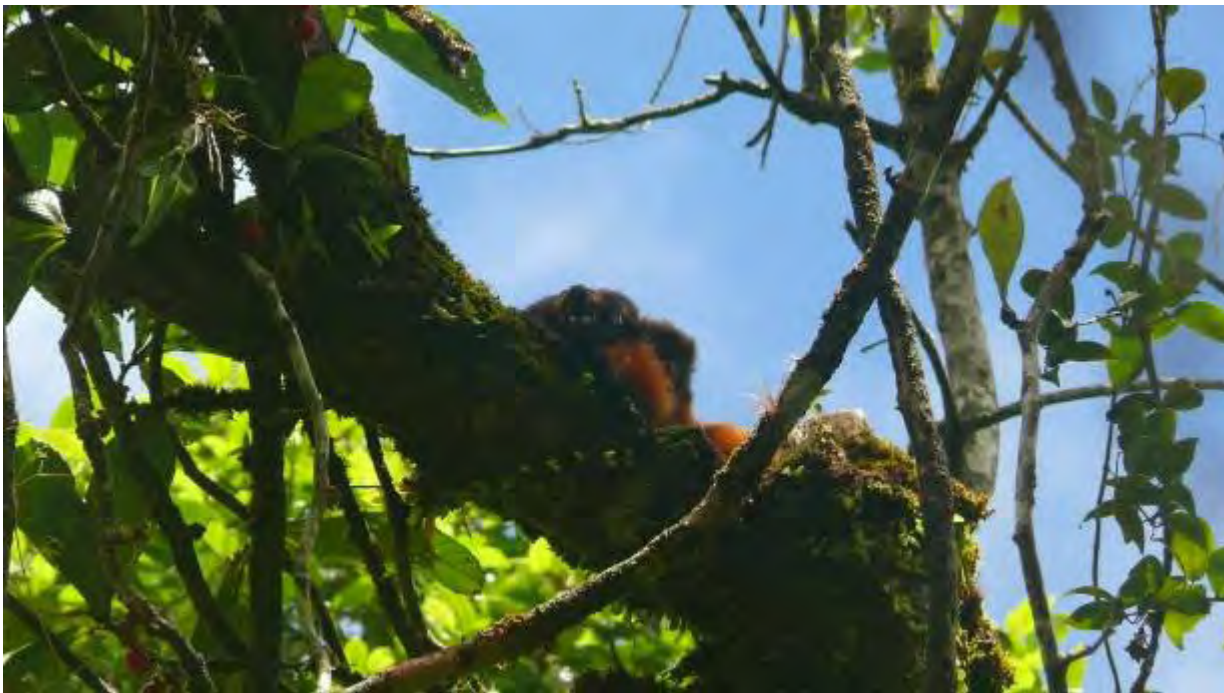
Environmental education programs and outreach campaigns to explain and disseminate the problems caused by invasive species and the need for the return of native species will be essential. It is very important to inform the local community about the capture of the GHLTs and the rationale for their removal and return to Bahia. The forest is in an urban area where many of the people like the lion tamarins. Ultimately, we hope that the local communities will support reintroduction of the golden lion tamarins.



Brazil, Cananéia, May 2010

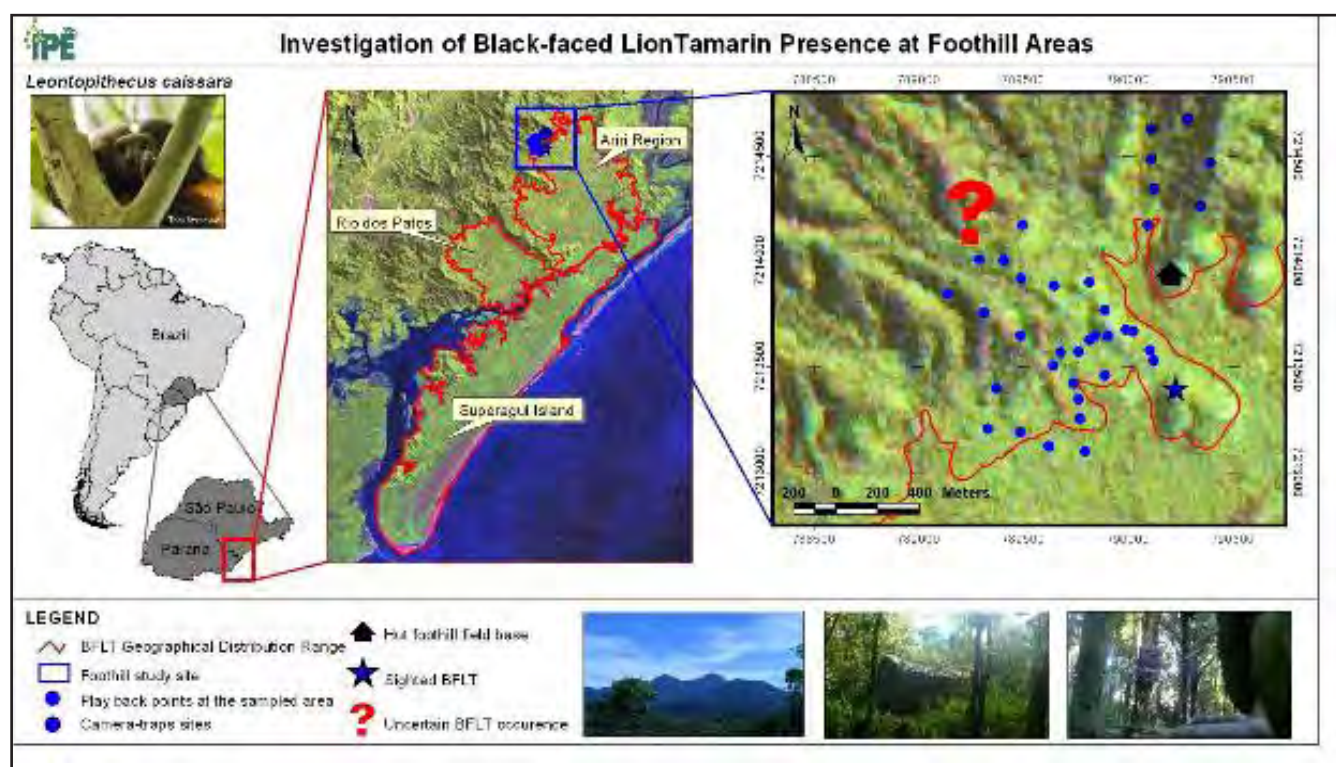
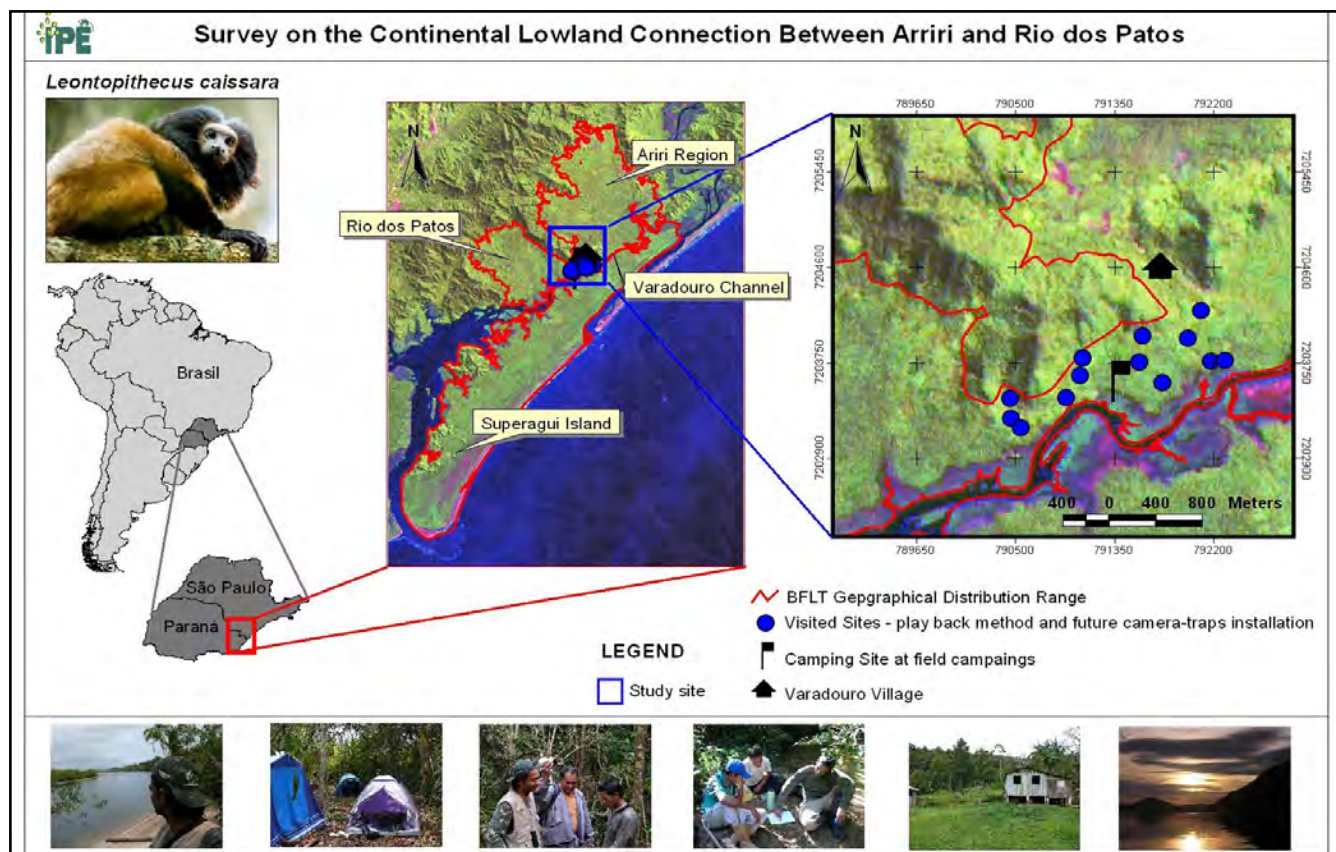
Here in Brazil everything is fine! The cold weather is coming, spite we don't have snow, we are starting to "freezing" in the middle of Atlantic rainforest!

The tamarins are very well, the nestling from Bina's group are becoming more and more strong and beautiful! Bina and Enferrujado is an excellent reproducer couple, like an nice example for the entire tamarins populations!!!! Look at Bina and this new offspring on the backs!



Can you see the nestling in the Bina's back? Besides to continuously monitor BFLT's groups looking for better understand ecologically them, ultimately we are focused on investigate the foothill areas and the narrow lowland passage between mainland populations. That information are going to help us to put together a better conservation program for the tamarins.

Our dear “boys”, our field assistants, spent around three days by month on the narrow passage between continental populations, at the Paraná state portion of it, on Rio dos Patos region, a very distant and isolated patch of lowland forest. During those field campaign days they walked a lot, trying to search every place on that vast area. We are using playback to reproduce the vocalization that the lion tamarins use to advertise neighbors that those part of the forest is already inhabited by them. This is an efficient survey method since the inhabitants will respond those calls to defend their home range. Unfortunately, we haven’t found nothing yet, but we keep hard and strong in the search of the “lost link” of tamarins!!!! It’s important to verify if they use those part of their geographical distribution to know if the two mainland population are isolated or just a functional one. If the don’t are in contact, change genetic material, we should do it through management in a close future.



Out that, we are persistent on the foothill areas survey; last month we've changed all of the target visited places of the playback, so, expanding the survey areas to be survey! Now, we need good vibrations, especially from our Italian friends, to discover new tamarins groups even on the foothill forest. If the tamarins inhabit those regions we will be able to bring it out, increasing considerably their habitat availability, improving a lot their conservation status!

UM ABRAÇO GIGANTE!!!!



Alexandre was passing over by a flood bridge. Can you believe that? In the summer, rains a lot, and a big part of the forest stay flood!



Toninho searching for the Bina's group in a nice path of forest!



Luis and Natanael doing playback in the foothill areas



Natanael was observing the tamarins



Nata and Toninho in a good time, the lunch time! They were eating bread with sardine, accompanied of a nice coffee – our most traditional lunch during field work!



Remembering Devra Kleiman

- a Tribute to a Pioneer in Conservation Biology

Lou Ann Dietz, President, Save the Golden Lion Tamarin



Devra Kleiman, December 1997.

Photo: Smithsonian's National Zoo, Jessie Cohen

Devra G. Kleiman, died unexpectedly of cancer at age 67 on April 29, 2010 in Washington DC, after a brief hospitalization. The news of her death generated a spontaneous outpouring of tributes from hundreds of people around the world whom Devra mobilized on a multitude of paths in conservation and science – from people whose lives Devra touched directly and from those who admired her work from afar. As one of those whose careers in conservation biology were launched through Devra's offer of an opportunity to collaborate, I offer this tribute on behalf of all those conservation biologists whose work and lives she influenced. In my case, collaboration with Devra turned into a life project and 30 years of friendship. We will keep her enthusiastic spirit alive, by continuing and expanding her legacy of collaborative science-based conservation.

Throughout her forty-year professional career, Devra Kleiman demonstrated innovative scientific approaches to addressing issues of conservation and consistently modeled the collaborative processes that are critical for effective conservation actions. In her own words, her interests and expertise were in “mammalian

reproduction and behavior, zoo biology, conservation biology (specifically endangered species recovery and reintroduction), organization development and institutional strategic planning and program evaluation.” She authored more than 150 scientific and popular publications, lectured widely, and was editor or co-editor of 8 books and symposium volumes, including the much referenced *Wild Mammals in Captivity* and *Lion Tamarins: Biology and Conservation*. Over her career, she served as a mentor for hundreds of students throughout the world. Six masters students, 10 Ph.D students, and 18 post doctoral fellows and visiting scientists directly benefitted from her tutelage.

Devra is perhaps best known for her work with golden lion tamarins (GLTs), *Leontopithecus rosalia*, a tiny primate endemic to the Atlantic Forest of Brazil. In 1972, when she first became involved with the critically endangered golden lion tamarin, there were at most several hundred animals in the wild, and fewer than 75 in sixteen zoos and other facilities around the world. It was clear that an intense, coordinated effort would be required to change the course for this population. Devra began this collaborative international effort in 1974, seven years before the first American Zoo and Aquarium Association Species Survival Plan for regional cooperative breeding was developed. At this time she assumed responsibility for the golden lion tamarin studbook. By 1980, when the captive population was expanding rapidly, in an unusual decision for the time, zoos owning specimens of *L. rosalia*, agreed not to sell their stock so that golden lion tamarins would no longer enter the animal trade and be used for commercial gain. Then, in a second progressive decision, both the zoos that owned golden lion tamarins and those that had them on loan agreed to form a consortium and become signatories to an international cooperative research and management agreement for the golden lion tamarin, with all decisions concerning the management of the captive population being placed in the hands of an elected subgroup. This international collaborative agreement predated the development of zoo species conservation programs. The first global demographic and genetic Masterplan was done for the captive GLTs in

1980 and focused on managing to minimize inbreeding and to enhance population growth. The Global Species Management Plan model for international collaboration currently being developed by the World Association of Zoos and Aquariums (WAZA) and the IUCN Species Survival Commission Conservation Breeding Specialist Group (CBSG) is an evolution of the international management concept that began with the golden lion tamarins. Devra Kleiman was a founding member of the International Committee for the Conservation and Management of Lion Tamarins, which officially advises the Brazilian government on the management of the four species of lion tamarins, both in captivity and in the wild. She was an active participant in that body until a few days before her death. Devra negotiated the 1990 transfer of ownership to the Brazilian government of all but five golden lion tamarins in captivity. Recently the Brazilian authorities have used the lion tamarin model in the creation of other international management committees and for regional conservation planning.

In 1972, a Wild Animal Propagation Trust Conference on the Golden Marmoset took place at the National Zoo. The final paper in the conference, given by Dr. Devra Kleiman, was titled "Recommendations on Research Priorities for the Lion Marmoset". In this presentation Dr. Kleiman identified the importance of applying reproductive and behavioral science to the issue of captive breeding and laid out the roadmap that was to guide golden lion tamarin research for the next twelve years. The recommendations she outlined included: 1) field work; 2) training Brazilian scientists; 3) undertaking research using non-endangered marmoset species to a) determine estrus, b) determine ages at which young can be removed from adults, c) determine if adolescents need experience in interacting with younger animals in order to rear their own offspring, and d) determine if the presence of adults influences age of reproductive maturation; and 4) holding animals in pairs and moving isolates in order to effect this research. Dr. Kleiman undoubtedly was one of the pioneers in advocating and practicing the application of science to captive breeding and conservation.

The early research led to several breakthroughs in the understanding of lion tamarin biology which in turn facilitated the beginning of growth of the captive population through reproduction. At the same time Dr. Ademar Coimbra-Filho, head of the Centro de Primatologia do Rio de Janeiro, was working to establish a reserve for the golden lion tamarin in its natural habitat - the Atlantic Coastal Forest of Rio de Janeiro, Brazil. The Poço das Antas Biological Reserve was officially designated by the Brazilian government in

1974 – the country's first biological reserve. In the early 1980's, with the captive population continuing to grow, plans began for reintroducing GLTs to the Reserve. The multi-faceted reintroduction plan included attention to a) continued growth and management of the captive population, b) field research on the population status and behavioral ecology of wild GLTs, c) reintroduction (including pre-release training, release and long term monitoring), d) habitat protection and restoration, and e) capacity building and outreach, and was probably the most thoroughly developed of any reintroduction plan up to that point. Devra recruited a multidisciplinary team, including international and local participants to work with the Brazilian government. From the beginning of the reintroduction effort, Dr. Kleiman worked to create Brazilian capacity and ownership. In addition Dr. Kleiman was adamant that training and mentorship of Brazilian professionals be central to the effort. The reintroduction process evolved over the years into a multi-institutional program to save the species from extinction, with systematic research on both the wild and reintroduced populations, the habitat, and the socio-economic context, providing new insights that resulted in program modifications along the way. In 1993, the Associação Mico-Leão-Dourado (AMLD), a Brazilian NGO dedicated to the conservation of the golden lion tamarin, was formed. AMLD continues today to mobilize, guide, and monitor efforts of multiple stakeholders to achieve the goal of a viable population of at least 2,000 golden lion tamarins living free in a landscape of 25,000 hectares of protected and connected Atlantic Forest habitat. Dr. Kleiman's innovative, holistic approach set the standard for future reintroduction efforts for other species, with emphasis on a multi-disciplinary collaborative approach to conservation, in-country capacity building with eventual transfer of program ownership, and on-going monitoring, evaluation and adjustment of conservation efforts.

A critical component of the GLT reintroduction program was education. Through an extensive education effort, involving teacher training, local community outreach and partnerships with municipalities, people in Brazil became aware that they were in danger of losing a very precious natural resource. Landowners became engaged in the process of preserving the lion tamarin, committing tracts of private land for groups of reintroduced tamarins. Translocations of tamarins among these private lands began in 1993. A second federal biological reserve União, was established in 1997, and in 2002 the process of creating corridors to link reserves and private lands began.

In all, approximately 150 zoo-born tamarins were reintroduced and the population resulting from

these reintroductions now stands at greater than 600 individuals. Ninety-seven percent of the animals in this population were born in the wild. As a result of efforts led by Dr. Kleiman, and supported by the work of numerous collaborators, in 2007 there were between one and two thousand GLTs in the wild, and over 480 in 140 zoos around the world. In 2003 the IUCN changed the status of the golden lion tamarin from critically endangered to endangered, a clear measure of program success. In the early stages of the reintroduction project research had focused on causes of loss among reintroduced GLTs and their offspring, health aspects of reintroduction and the development of survival-critical behaviors among reintroduced animals and their offspring. Today efforts have moved from the study of the reintroduced, translocated and wild populations to management of the metapopulation and development of municipal and regional land use policies that encourage forest conservation for conservation of golden lion tamarins and other biodiversity as well as environmental services for the growing local human population in the São João River Watershed, only 80 km from the city of Rio de Janeiro. Dr. Kleiman continued her active involvement in the AMLD until her death.

Although probably most widely known for her work with the golden lion tamarin, Dr. Kleiman also was a major contributor to the understanding of the evolution of mating systems, reproductive and social behavior, and communication systems in mammals. Her research contributed substantially to knowledge of carnivores, rodents, sloths and pandas. Especially for the giant panda, Dr. Kleiman's involvement in captive research, scientifically-based conservation planning, professional education, and international collaboration were integral components of the conservation strategy.

The giant pandas Ling-Ling and Hsing-Hsing were gifts to the United States from China, arriving at the National Zoo in 1972. Almost no rigorous research had been conducted on pandas and little was known about their behavior. Conventional wisdom held that pandas were solitary creatures; so Dr. Kleiman and her colleagues kept Ling-Ling and Hsing-Hsing apart except for brief annual mating periods. Their enclosure was spartan, a plain yard with one climbing platform. They ate a simple diet of rice gruel and milk. The pandas' reproductive results, carefully tracked by the national media, were heartbreaking. Between 1983 and 1989, Ling-Ling became pregnant four times. One baby was stillborn; the others died within hours or days of their birth. During the roller coasters of those pregnancies, Dr. Kleiman led a team of scientists who used cameras and trained volunteers to track the animals' behaviors.

They wrote some of the first descriptions of pandas' vocalizations, their play, their scent markings, and their mating behavior. They concluded that pandas were social creatures who needed to interact. Devra told the Washington Post in 2001, "As I think back to what we didn't know in 1972, it was just about everything. We were flying blind." When the National Zoo's second pair of pandas arrived in 2001, they dined on bamboo, carrots, and apples, and they were allowed to play together in a large enclosure studded with sand wallows, ponds, and trees. In 2005, the couple successfully produced Tai Shan, the first panda born at the National Zoo to survive longer than a few days.

Devra Gail Kleiman was born Nov. 15, 1942, in the Bronx, New York. She graduated in 1964 with a B.S. in biopsychology from the University of Chicago. As an undergraduate, she took a part-time job as an assistant on a research project to tame wolves. She spent hours in their cages doing crossword puzzles and homework assignments to habituate the wolves to her presence. She took a baby dingo home one summer to raise at her mother's house in New York. As Devra's mother tells it, Devra slept with the animal, but after two nights it was put in the basement, where it wrecked the place while Devra was out buying 10 pounds of frozen horsemeat. The experience helped persuade Devra to forgo a career in medicine and study animal behavior instead.

Devra received her Ph.D. in zoology in 1969 from the University of London. From 1969 to 1971 she was a National Institute of Mental Health Post-doctoral Fellow at the Institute of Animal Behavior at Rutgers University where she also served as assistant professor in the Department of Psychology.

After being turned down for one job because "there weren't enough women's toilets," she once said, she became one of the Smithsonian National Zoological Park's first women scientists in 1972. She held the position of Reproduction Zoologist until 1979 when she became head of the Department of Zoological Research. She became the National Zoo's Assistant Director for Research in 1984, continuing in that position until 1996 when she became Senior Research Scientist, a position she held until her retirement in 2001.

After retiring, Devra turned her focus to facilitation, team building, negotiation and conflict management, earning a Certificate in Organization Development from the NTL Institute and starting her own consulting business – Zoo-Logic, LLC. Devra Kleiman was one of the earliest advocates for evaluation of conservation efforts, and continued her strong support for this process. In 2001

she was part of a team that evaluated USFWS recovery programs. In August 2007 she participated in a review of the National Fish and Wildlife Foundation Chesapeake Bay Small Watershed Grants Program, reviewing over 200 projects on restoration, conservation, capacity building and watershed planning (totaling approximately US\$19 million) funded under the program. She presented a paper, "Evaluation and Conservation Planning" at the 2009 Environmental Monitors Networking Forum, co-sponsored by the US Environmental Protection Agency and the National Fish and Wildlife Foundation. She served as North American Section Chair for the IUCN/SSC Reintroduction Specialist Group and was a member of IUCN/SSC Primate Specialist Group and the Conservation Breeding Specialist Group. Devra was an elected member of the Board of Governors of the Society for Conservation Biology from 2003-2006. She served as a Handling Editor for the journal Conservation Biology since the journal's first volume was published. She continued her involvement with the golden lion tamarin conservation program, and was an active participant in several other collaborations, including conservation of beach mice (with the U.S. Fish and Wildlife Service and Florida Fish and Wildlife Commission), and recovery of Channel Island foxes (with U.S. Fish and Wildlife Service). She also continued her position as adjunct professor of biology at the University of Maryland, a position she held since 1979.

Throughout her illustrious career Dr. Kleiman was always ahead of her peers in the application of science to animal management and captive breeding; the development of cooperative breeding programs and the concept of global captive management; facilitating broad collaborations that include zoos, national governments, and local communities; advancing the science of reintroduction; incorporating education and capacity building into reintroduction and field conservation efforts; and promoting the integration of critical evaluation into conservation initiatives. She consistently embodied the qualities of creativity, innovation, and collaboration.

In addition to communicating with her broad network of friends in conservation, Devra enjoyed spending time at her vacation home in Chincoteague, Virginia, near the National Wildlife Refuge on Chesapeake Bay. Last October (2009), Devra invited friends and colleagues to join her and her husband, Ian, on a trip to the Galapagos Islands, which she arranged. One of the participants related: "Devra's enthusiasm for every aspect of the natural history she observed during our travels so well illuminated everything [with which] she became associated. Her energy, humour and wisdom represented a model to us all."

Devra is survived by her husband of 22 years, Ian Yeomans of Chevy Chase, MD; three stepdaughters, Elise Edie of Ellensburg, Washington, Joana Domes of Calgary, Alberta, and Lucy Yeomans of Manchester, England; her mother, Molly Kleiman of Silver Spring, Maryland; a brother; and four grandchildren.

We will miss Devra's energetic, fearless systematic marching into new territory, both geographic and scientific, leading collaborators in pursuit of a conservation goal; her not-so-gentle prodding to "get things done"; her outspoken manner – telling us exactly what she thought; her boisterous laugh; her energy; her interest in our personal lives; her emails.

In March 2010, the Municipal Council of Silva Jardim, Rio de Janeiro, Brazil, in the heart of GLT habitat where the Poço das Antas Reserve is located, voted to award to Devra Kleiman the "Medal of Honor for her valuable contribution of service to environmental conservation and to the education of the youth of Silva Jardim." The award was presented posthumously to the Associação Mico-Leão Dourado on May 8, 2010.

"Devra was highly respected by managers and employees alike throughout the ICMBio, by local communities in Brazil, also by scientists, educators, and conservationists around the world. She was regarded as a visionary leader by anyone who ever worked with her. Devra's contributions to the conservation of the Lion Tamarins and their habitats since the 1970's, with dedicated and selfless service, were many and varied. She was certainly a key part to the initial movement to raise the Lion Tamarins' conservational flag. Her contributions to the environmental conservation in Brazil will never be forgotten. Devra was a remarkable leader, and knowing her personally, as we did for many years, made us well aware of the difference she made in the lives of so many people, from the conservation scientists, the local communities she worked with. Many will miss her."

Romulo Mello

President of the Brazilian Chico Mendes Institute for Conservation of Biodiversity

"It is now the responsibility of all those who have had the privilege to know Devra, and to have worked with her, to keep the flame of her highly motivated conservation spirit alight, as well as to ensure that all those programmes in which she was involved continue to flourish and go from strength to strength"

Jeremy Mallinson

Dr. Devra Kleiman

– an Appreciation

It seems unrealistic to think of a world without the vibrant, ebullient and dedicated Devra Kleiman.

Since first meeting Devra in the mid-1970s I constantly learnt so much from her, and over the last 35 years benefited so greatly from her guidance, support and friendship. Devra served on the JWPT/DWCT Scientific Advisory Committee during a fifteen year period, 1986-2001, and during this time visited the Trust's International Training Centre in Jersey on several occasions. Devra was always a champion of the educational objectives of the Training Centre at Les Noyers and took time to present a number of most meaningful and worthwhile tutorials at the Centre.

Devra has inspired so many people from around the world and her sound scientific mind has contributed so significantly to a multitude of international conservation programmes. Devra's enthusiasm for every conservation programme that she embarked upon was contagious to all those associated with them. And having worked with Devra since 1980, on all four international programmes concerning the conservation of lion tamarins in Brazil, I know how very much she contributed to one of the great success stories in the global conservation movement. Also, recognising the result of these lion tamarin conservation programmes has so greatly aided the preservation of one of the world's biodiversity 'hotspots', Brazil's: 'Mata Atlantica'.

It is now the responsibility of all those who have had the privilege to know Devra, to have worked with her, and to have been inspired by her knowledge and motivation, to keep the flame of her conservation spirit alight, and to ensure that all those programmes that she was involved in continue to flourish and go from strength to strength.

Last October I joined Devra and Ian on a trip to Ecuador and the Galapagos Islands, which she had arranged. Devra's enthusiasm for every aspect of the diverse natural history she observed during our travels, and her great interest in the culture of the local people, so well illustrated her attitude to everything that she became associated with. Her energy, humour and wisdom represented a model to us all, and I am sure that all such fond memories of Devra will always be with those who had the privilege to have her as a friend.

Jeremy Mallinson, 6 May 2010



Lion Tamarins of Brazil Fund

- an update

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

From 2009 to June 2010 the Lion Tamarins of Brazil Fund received a total of 109.000 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 four 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 70.000 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”

In addition it has been decided to support the urgent project of removing the introduced population of Golden-headed Lion Tamarins from the Golden Lion Tamarin area (Niteroy) in order to avoid hybridization and uneven competition. For further details please read the article on page 5-7 in this volume of Tamarin Tales. The amount needed from the Lion Tamarins of Brazil Fund is not yet known, but the full budget of

the project, including capture in Niteroy and release in Bahia lies around 250.000 US\$. The project manager is looking for funds from somewhere else too, but the LTBF has so far offered to support the project with up to 100.000 US\$. We are therefore desperately looking for additional donations this year and hope for all our usual supporters that they can manage to increase their contributions in the coming years. I know it is a bad timing for such hopes. On the other hand there will never be a good timing for conservation crises, and in this case we are simply running out of time. We must act now.

For further information about any progress in the conservation of Lion Tamarins please refer to www.ltbf.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 2009 till June 2010 the following institutions have contributed to the Lion Tamarins of Brazil Fund:

Donations larger than \$10,000

Copenhagen Zoo

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

Zoological Society of London, UK

Wilhelma Zoo Friends, Germany

Dublin Zoo, Ireland

Colchester Zoo, UK

Parco Zoo Punta Verde, Italy

Baton Rouge Zoo, USA

Donations \$500 to \$5,000

Conservatoire pour la Protection des Primates, France

Belfast Zoo, Northern Ireland

Monkey Park, Canary Islands

Zoo de la Palmyre, France

Audubon Nature Institute, Audubon Zoo, USA

Denver Zoological Foundation, Inc., USA

Rare Species Conservatory Foundation, USA

New Mexico Bio Park, USA

National Aquarium in Baltimore, USA

Sedgwick County Zoo, USA

Toronto Zoo, Canada

Saitama Children's Zoo, Japan

Lisbon Zoo, Portugal

Tiergarten Heidelberg, Germany

Basel Zoo, Switzerland

Rosamond Gifford Zoo, USA

Jeremy Mallinson

Donations Less than \$500

Scoville Zoo, USA

Jerusalem Biblical Zoo, Israel

Plock Zoo, Poland

Tamarin Tales is produced by

**Copenhagen Zoo
&
The International Committee for the Conservation and Management of Leontopithecus**

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Written Contributions to Tamarin Tales are Welcome

