Global Re-introduction Perspectives: 2010

Additional case-studies from around the globe

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IUCN/SSC Re-introduction Specialist Group (RSG)

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هيئة البيئة - أبوظبي
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Published by: IUCN/SSC Re-introduction Specialist Group & Environment Agency-ABU DHABI

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Citation: Soorae, P. S. (ed.) (2010) GLOBAL RE-INTRODUCTION PERSPECTIVES: Additional case-studies from around the globe. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi, UAE, xii + 352 pp.

ISBN: 978-2-8317-1320-5

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Re-introduction and translocation of golden lion tamarins, Atlantic Coastal Forest, Brazil: the creation of a metapopulation

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Introduction

The golden lion tamarin (*Leontopithecus rosalia*), IUCN listed in 2003 as Endangered B1ab(iii), appears in the Brazilian Red List as Endangered (2009), CITES App. I (1975). This species is found in the lowland Atlantic Forests of the state of Rio de Janeiro, a biodiversity hotspot. The Golden Lion Tamarin Conservation Project (GLTCP) has focused its current conservation efforts on the region of the São João river watershed, where over 90% of the existing population lives and where there is the largest amount of remaining forests. The region has multiple land uses, agriculture, cattle and urban expansion predominate. The coastal areas are under intense urbanization pressure. The golden lion tamarins have been used effectively as a flagship species for the conservation of biodiversity in the Atlantic coastal rainforest of Brazil (Dietz, 1994).

Goals

- Goal 1: Re-enforce and expand the wild population by increasing its size, genetic diversity and genetic flow to form a functional metapopulation.
- Goal 2: Contribute to the science of conservation biology by testing the most cost-effective methods for re-introduction, translocation and management of a meta-population.
- Goal 3: Increase available habitat by protecting forest patches in private lands that receive reintroduced animals, creating linkages between forest patches by

construction of corridors and promoting the creation of protected reserves, public and private.
- Goal 4: Increase conservation education and outreach programs to influence public opinion and policy at local and national levels.
- Goal 5: Manage the wild and captive population as a single metapopulation.

Success Indicators

- Indicator 1: Number of surviving and reproducing tamarins in private lands and reserves (objective is a minimum of 2,000 tamarins in viable connected habitat by 2025) in viable populations managed as a metapopulation.
- Indicator 2: Measures of genetic diversity over time: pedigree analyses and molecular genetics.
- Indicator 3: Total area of habitat protected formally or by personal commitment that has wild living tamarins (minimum objective is 25,000 protected and connected hectares by 2025).
- Indicator 4: Number of private landowners adhering to the re-introduction program and to the conservation of the golden lion tamarins.
- Indicator 5: Number of viable populations.
- Indicator 6: Inclusion of the conservation agenda in the land use planning of the region.
- Indicator 7: Number of scientific publications, theses, dissertations and other academic documents.

Project Summary

The GLTCP has used both re-introduction and translocation as part of a broad conservation program to save the species from extinction and to protect its habitat, the lowland Atlantic forest (Kleiman & Rylands, 2002; Oliveira *et al.*, 2008). The conservation goal, defined in 1984 and modified by successive PHVAs (1991; 1997; 2005), is to have 2,000 tamarins living in 25,000 ha of protected and connected forests. Currently, we estimate 1,600 tamarins in about 15,000 ha of forest (Holst *et al.*, 2006; Oliveira *et al.*, 2008). In the early 1980s there was a strong need to augment the population and to expand its geographic distribution in the wild. Tamarins were first introduced into a protected area (The Poço das Antas Reserve) and thereafter into privately owned forests in order to protect those remaining habitats. Re-introductions occurred from 1984 to 2000 (159 animals) and a group of five wild-born animals were re-introduced in 2005. The initial conditions that supported the re-introductions included: a self-sustaining captive population, a protected area,

Golden lion tamarin with young

knowledge of behavior and ecology from captive and field studies, the presence of an *in situ* conservation program and sufficient resources (Beck *et al.*, 2002; Kleiman *et al.*, 1991). The forests in the region were fragmented and the wild populations were isolated from each other, most consisting of small groups. The involvement of local landowners also was key to developing a pro-conservation attitude in the region. Today, over 40 properties have descendants of the re-introduced tamarins and >10 have become formally designated as Permanent Private Reserves (RPPNs).

Conducting transects in the forest

The re-introduction project used a soft release protocol and tested the influence of pre-release training, post-release management and origins (wild versus captive) on survival to two years after release or birth in the wild (see Kleiman & Rylands, 2002). Survival was significantly higher for those under intense post-release management and the wild-born offspring of the re-introduced adults. There was extensive monitoring after release to account for animal losses, to gather data on body condition, demography, genetics (pedigree and molecular) and behavior (Beck *et al.*, 1991; Kleiman *et al.*, 1991). The behavioral data allowed us to compare the performance of animals and their wild-born offspring in behaviors related to survival and reproduction (Stoinski *et al.*, 2002). The data on demography, genetics and body condition allows us to model population viability and to adaptively manage the groups and populations. The re-introduction protocol is well established. The translocation of wild tamarins used the knowledge developed from the re-introduction project and ecological studies as well as a 1991 complete census to move isolated groups of tamarins from small patches of forest that were at high risk of loss to a large protected area (2,400 ha) of good quality habitat (see Kleiman & Rylands, 2002; Kieurlff & Rylands, 2003). From 1994-1997, six social groups (42 animals) were translocated to forest managed by the national railroad company. In 1997, the government transformed this forest into the União Biological Reserve. The groups were monitored to gather data on demography, genetics, behavior and habitat use. This population has expanded to over 200 animals. This project provided valuable information about behavior and habitat use after colonization of a new area.

One key aspect of the success of these conservation efforts has been the multi-institutional commitment in both *in situ* and *ex situ* conservation. The involvement of zoos (>100) was crucial for maintaining a well-managed captive population and

for supporting the *in situ* efforts. One innovation was developing and implementing "free-ranging" exhibits in zoos, which provide tamarins the opportunity for complex interaction with a natural environment, and allow the observers to judge the capabilities of individual animals. A system of "gateway" zoos with free-ranging exhibits was established to channel the re-introductions (Stoinski *et al.*, 1997). A second key aspect was the Brazilian team, which was institutionalized as an NGO in 1992: the Golden Lion Tamarin Association (i.e., Associação Mico Leão Dourado). This team of local well-trained and motivated individuals has carried out monitoring and management of the animals, identified potential forest patches for re-introduction and developed education and outreach programs, influenced public policies locally and nationally. The AMLD also deals with threat reduction, e.g. reducing poaching and hunting, further habitat destruction and controlling invasive introduced marmosets. The NGO has been instrumental in developing a conservation attitude in the region, mainstreaming the conservation agenda in watershed management plans, recruiting local landowners for the re-introduction program, maintaining conservation education programs and developing a model landscape approach to connect the populations of tamarins (see Kleiman & Rylands, 2002; Oliveira *et al.*, 2008)). The translocation team helped to establish interactions with government and NGO institutions in the coastal towns that harbor small forests with groups of tamarins. One important partner is Brazil's Ministry of the Environment (through IBAMA and ICMBio) which manage the reserves, provides logistic support and head the Internal Management Committee for Lion Tamarins (ICCM). Universities and research institutions from the United States (University of Maryland, Smithsonian's National Zoological Park) and Brazil (UENF; FIOCRUZ; CPRJ) have contributed with studies on tamarin ecology and behavior, parasitology, vegetation quality, and threats to the tamarins (introduced marmosets and hunting).

The GLTCP uses the knowledge obtained and the database created from over 25 years to manage the wild populations as a meta-population (Oliveira *et al.*, 2008; Holst *et al.*, 2006). Three of the six existing potentially viable populations were the result of reintroduction (N>600 individuals) and one the result of translocation (N=200), that is, more than 50% of the tamarins and habitat available. These populations contribute to retention of overall genetic diversity, reduce the effects of genetic drift and inbreeding, and add new genetic diversity from captivity and from the isolated coastal populations (Dietz *et al.*, 2000; Grativol *et al.*, 2001). The meta-population management includes establishing connectivity among populations through forest corridors and translocations. Additional, re-introductions are not planned but have not been excluded as a possibility to form new populations as additional forests are acquired or to replace locally extinct populations. The challenges posed by meta-population management will require new techniques for translocation, e.g. where, when and how animals should be moved so as to optimize the impact on demography, genetic flow and spatial distribution over the landscape. Additionally, more efficient methods for monitoring population size and spatial distribution are being developed to evaluate success and increase cost effectiveness.

Major difficulties faced

- Mortality of captive born animals.
- Complex research permit structure.
- Need for intense and long-term monitoring.
- Introduction of non-native invasive marmosets.
- Access to forests in private lands.
- Lack of a scientific knowledge base about re-introductions at onset.
- Changing government organization and national economic conditions (e.g. inflation and currency).
- Securing funding for a long term project.

Nest box at re-introduction site

Major lessons learned

- Importance of a well managed self-sustaining captive population.
- Importance of long term post-release monitoring.
- Importance of a well trained knowledgeable local field team and scientists.
- Importance of a scientific (experimental) approach, i.e. hypothesis testing.
- Importance of strategic planning, adaptive management and critical evaluation.
- Importance of developing strong institutional and fund raising capabilities.
- Need for a multidisciplinary approach.
- Need for strong local leadership.

Success of project

Highly Successful	Successful	Partially Successful	Failure
√			

Reason(s) for success/failure:

- The descendants of the re-introduction program represent over 50% of the tamarins living in the wild.
- A series of techniques for re-introduction have been tested and we can now do them reliably.
- The geographic distribution increased by 60%, with many private landowners protecting remaining forest.
- The translocation project resulted in a self-sustaining population in a newly designated protected area.
- A metapopulation of six sub-populations has been established with a feasible management plan.

- A local public that is more conscious and supportive of conservation initiatives.
- Positive input into the local economy.
- Training of numerous Brazilians in wildlife conservation and management.

References

Beck, B. B., Castro, M. I., Stoinski, T. S. & Ballou, J. D. 2002. The effects of prerelease environments and post-release management on survivorship in re-introduced golden lion tamarins. In: Kleiman, DG & Rylands AB, editors. Lion Tamarins: Biology and Conservation. Washington and London: Smithsonian Institution Press. p 283-300.

Dietz, J. M., Baker, A. J. & Ballou, J. D. 2000. Demographic evidence of inbreeding depression in golden lion tamarins. *In:* Young AG, Clark GM, editors. Genetics, demography and population variability. Cambridge: Cambridge University Press. p 203-211.

Grativol, A. D., Ballou, J. D. & Fleisher, R. C. 2001. Micosatellite variation within and among recently fragmented populations of the golden lion tamarin (*Leontopithecus rosalia*). Conservation Genetics 2: 1-9.

Holst, B., E. Medici, O. Marinho-Filho, D. Kleiman, K. Leus, A. Pissinatti, G. Vivekanda, J. Ballou, K. Traylor-Holzer, B. Raboy, F. C. Passos, K. Vleeschouwer & M. Montenegro. 2006. Lion Tamarin population and habitat viability assessment workshop 2005, final report, pp. 193. IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN, USA.

Kierulff, M. C. M. & Rylands, A. B. 2003. Census and distribution of the golden lion tamarin (*Leontopithecus rosalia*). American Journal of Primatology 59: 29-44.

Kleiman, D. G., Beck, B. B., Dietz, J. M. & Dietz, L. A. 1991. Costs of a re-introduction and criteria for success: accounting and accountability in the golden lion tamarin conservation program. Symp. Zool. Soc, Lond 62: 125-142.

Kleiman, D. G & Rylands, A. B. 2002. Lion tamarins: biology and conservation. Washington, D.C.: Smithsonian Institution Press. 405 p.

Oliveira, P. P., Grativol, A. D. & Ruiz Miranda, C. R. 2008. Conservação do mico-leão-dourado: enfrentando os desafios de uma paisagem fragmentada. Campos dos Goytacazes: Editora Universidade Estadual Norte Fluminense Darcy Ribeiro. 250 p.

Stoinski, T. S., Beck, B. B., Bowman, M. & Lenhardt, J. 1997. The gateway zoo program: A recent initiative in golden lion tamarin reintroductions. In: Wallis J, editor. Primate Conservation: the role of zoological parks. Norman, Ok: American Society of Primatologists. p 113-129.

Stoinski, T., Beck, B. B., Bloomsmith, M. & Maple, T. 2002. A behavioral comparison of captive-born, re-introduced golden lion tamarins and their wild-born offspring. Behaviour 140: 137-160.