

Social group fission and the formation of new groups after translocation of Golden Lion Tamarins (*Leontopithecus rosalia*), Brazil.

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Introduction

The golden lion tamarin (*Leontopithecus rosalia*) is endemic to the Atlantic Forest of Brazil and was historically found in the coast of Rio de Janeiro State and south of Espírito Santo State (Figure 1). In 1992, during a survey of GLT populations, we found twelve groups (60 individuals) isolated in small secondary forest fragments with a total area of less than 200 ha each (Figure 2; Figure 3). The primary goal of the translocation project was to rescue these isolated GLT groups and to establish a new population in União Reserve. The tamarins were wild-caught, the whole groups were moved as a unit, they were moved to an area inside its historic range and there were no conspecific residents in the release site.

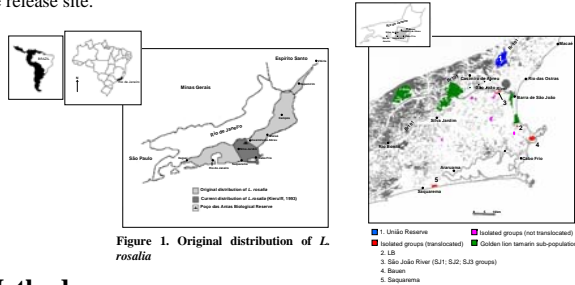


Figure 1. Original distribution of *L. rosalia*

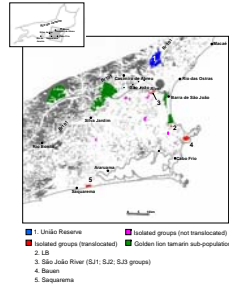


Figure 2. Isolated groups, translocated GLT groups and União Reserve



Figure 3. Fragments with *L. rosalia*



Figure 4. União Reserve

Methods

Release site

Between 1994 and 1997, 42 golden lion tamarins (six groups) were captured and immediately translocated to a single, large protected forest. The União Farm (nowadays União Biological Reserve) originally belonged to the Brazilian Federal Railway Network. The area is located in the municipalities of Rio das Ostras and Casimiro de Abreu, has a total area of 3200 ha and 2400 ha of forest (Figure 2; Figure 4). Although it is located within the natural range of the species, there was no native GLT population in the União Reserve.

Capture

The entire groups were captured using Tomahawk traps baited with bananas. Some groups, however, did not enter the traps and we used a captive GLT to attract the groups. The GLT was kept inside a cage and a fish-net was placed around and over the cage. When the groups tried to approach the cage one individual was trapped. This animal was fitted with a radio-collar and released at the same site. When the individual returned to the group it was possible to monitor the holes used as sleeping sites by the group. Once a hole was found in a tree of manageable dimensions and character, the hole was closed and the tree section cut out. Captured animals were immobilized and body measurements and blood samples (< 2ml) were taken. All individuals were tattooed and dye-marked for field identification.



GLT leaving the sleeping tee



GLT transfer to the artificial tree den



Golden Lion tamarin with radio-collar



Captive GLT used to attract the groups

Release

In the morning following the processing the group was transferred to an artificial den made from a hollow tree with one lateral door that was transported to the forest and tied to a tree. We stayed hidden in a tent of leaves and a long fine line was tied to the door. From inside the tent, we pulled the door open. We tied fruits (bananas and grapes) in trees outside the artificial den, but the groups never ate them. On the next day after the release we started to collect data on the translocated groups. Initially the location was collected by triangulation. After the group had established a home range, it was habituated to the observers and data were collected visually.

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Results and Discussion

From October 1994 to 2004 six translocated groups and 29 newly-established groups formed by individuals that dispersed from the translocated groups and its descendents were monitored = total 35 groups. Two different post-release movements were observed in the translocated groups (Figure 4): (1) they settled around the release site and increased their home range gradually; (2) the groups left the release site and established home ranges near to previously-established groups, or were chased by them and moved around until finding a part of the forest without a resident group to establish their home range.

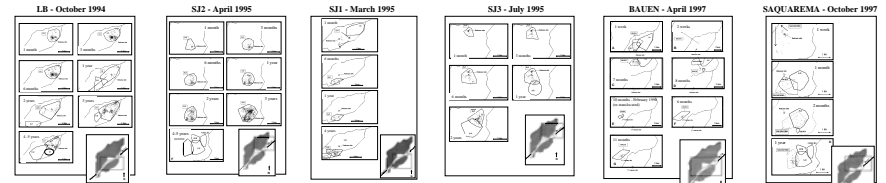


Figure 4 - Ranging patterns of the translocated groups.

Emigration and immigration were common following translocation, and were more frequent when groups were released between two established groups (Figure 5). The unsaturated habitat and the low density in the release site increased the opportunities for the establishment of new groups by individuals dispersing from the original translocated groups (Figure 6). The original translocated groups usually settled far from each other and interactions between them were highly aggressive. In contrast, the newly-formed groups usually established home ranges close to their original groups and interactions were much less violent. One year of monitoring was the minimum time necessary to assess the establishment of the translocated lion tamarin groups since all groups settled within six months after release, and had established home ranges one year after translocation. Home range size decreased with the increase in population density (Table 1).

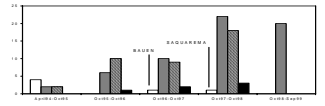


Figure 5. Emigration after translocation.

Table 1. Home range size of the translocated and formed groups

Groups	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
LB	141	170	181	171	100	107	83	72	65	85	88
S12	128	108	104	104	123	132	122	121	151	154	100
S11	237	73	129	43	67	58	78	50	50	50	50
S13	106	447	223	135	173	138	89	48	50	50	50
BAUEN	330	259	137	87	147	161	113	138	138	138	138
SAQUAREMA	126	123	130	130	130	130	130	130	130	130	130
GN	70	66	67	67	67	67	67	67	67	67	67
FURA	61	61	61	61	61	61	61	61	61	61	61
PUR	123	121	128	130	130	111	128	111	128	111	128
BN	70	66	67	67	67	67	67	67	67	67	67
LN	106	104	104	104	104	104	104	104	104	104	104
LP	78	78	78	78	78	78	78	78	78	78	78
RB	67	67	67	67	67	67	67	67	67	67	67
UN	120	120	120	120	120	120	120	120	120	120	120
DR	67	67	67	67	67	67	67	67	67	67	67
POC	67	67	67	67	67	67	67	67	67	67	67
SA	141	141	141	141	141	141	141	141	141	141	141
CUR	141	141	141	141	141	141	141	141	141	141	141
BD	141	141	141	141	141	141	141	141	141	141	141
MA	141	141	141	141	141	141	141	141	141	141	141
FD	141	141	141	141	141	141	141	141	141	141	141
PA	141	141	141	141	141	141	141	141	141	141	141
BUC	141	141	141	141	141	141	141	141	141	141	141
DEF	141	141	141	141	141	141	141	141	141	141	141
VIA	141	141	141	141	141	141	141	141	141	141	141
JB	141	141	141	141	141	141	141	141	141	141	141
FO	141	141	141	141	141	141	141	141	141	141	141
VU	141	141	141	141	141	141	141	141	141	141	141
TM	141	141	141	141	141	141	141	141	141	141	141
UND	141	141	141	141	141	141	141	141	141	141	141
GMAR	166	166	166	166	166	166	166	166	166	166	166
MEANARD	166	166	166	166	166	166	166	166	166	166	166

* Reproductive couple produced; ** Group not monitored during a year; *** Home range not established.

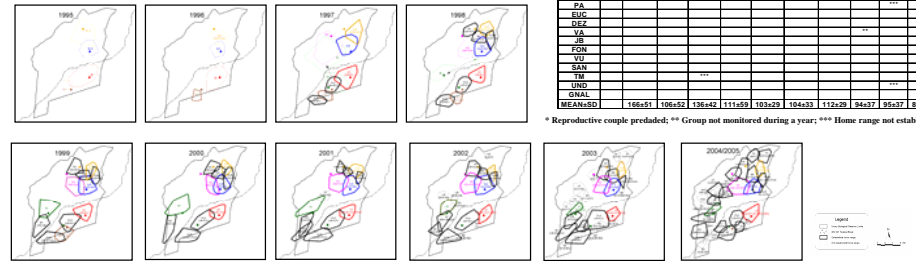


Figure 6. Home range established by the original translocated groups (colour lines) and by the new groups (black lines) formed in União Reserve from 1994 to 2004.

The translocation of the golden lion tamarins was a success. In 2006 the population numbered around 220 individuals in more than 30 groups. The translocated population exhibited similar survivorship and reproduction rates in comparison to the native population in Poço das Antas. The comparison with other *Leontopithecus* populations have shown that the translocated tamarins behave as "normal wild" tamarins. The abnormal movements observed after release, that caused social disruption in some groups, occurred within six months after translocation. Thereafter the groups stabilized and no negative impact was observed consequence of these events. The dispersal behavior after the release of lion tamarin groups must be taken into consideration during any translocation program.