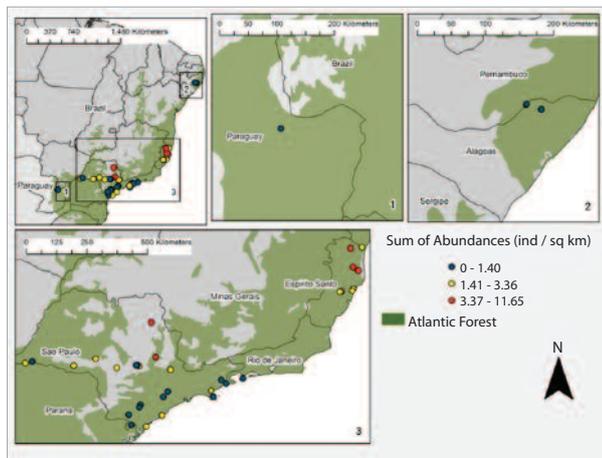


TROPHIC CASCADES IN A DEFAUNATED LANDSCAPE: THE ATLANTIC RAINFOREST PERSPECTIVE

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Priority areas for conservation of large mammals in the Atlantic Brazilian forest. This project sampled 12 Protected Areas in São Paulo state

Dominant and keystone species are recognized by their profound impacts on the composition, dynamics, and functioning of ecological communities. In Neotropical rain forests, large predators (such as jaguars, pumas, and harpy eagles) can control the populations of dominant herbivorous mammals (such as deers, tapirs, and peccaries), which in turn, control the populations of plants.

Deforestation, fragmentation and poaching have eliminated the top predators and now are also affecting the populations of meso- and mega-fauna over vast tracts of tropical forest. Thus, the removal of these mammals may have profound effects on the diversity and species composition of forest plants and other trophic levels.

Our project takes advantage of a unique defaunation gradient at the São Paulo state coastal

Atlantic rain forest in Brazil. In this area, there are many large and connected protected parks, which could harbor all native vertebrates. Extensive surveys through our previous BIOTA project has found clear defaunation gradient, with parks with complete mammal assemblage contrasting with “empty” parks. We are now examining aspects of the early regeneration of forest trees including seed dispersal and predation, seedling survival and trampling impact of large-bodied mammals and species richness; seedlings diversity and above-ground biomass. Based on excluded plots replicated in different areas, and vegetation types in this defaunation gradient, we will look for evidences to support or reject the “top down” effects on forest regeneration.

In addition, as elusive mammals (such as felids, tapirs and peccaries) are difficult to survey, since they are rarely seen during line transects, we will take advantage of the development of molecular biology and use non-invasive sampling (such as faecal and hair samples) and specific DNA markers to estimate the population sizes of these species. Moreover, we can also study behavioral and population characteristics of these mammals, such as dispersal and genetic structure, which can be difficult to determine using other methods.

In order to sample the populations of elusive mammals (tapirs and felids), we are developing DNA markers for individual identification. These large mammals are hardly seen in the forests, but frequently signs of their presence are found as footprints and stools. Faecal samples are valuable especially for elusive species because few grams provide DNA from thousands intestinal cells of these animals.

Stool samples of tapirs, peccaries and felines have been collected in the studied areas to obtain DNA. All sampled have being georeferenced and individual identification will be carried out using DNA markers. Thus, we can estimate the minimum population size of these animals in the studied areas. Moreover, after plotting the individuals genetically identified on maps, and the pattern of movement of these organisms will be examined.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

1. Census of large and small mammals

As part of the BIOTA-FAPESP biodiversity sampling program, mammal abundance was estimated for 12 protected Atlantic forest areas in São Paulo State and it was obtained from a standardized series of diurnal line-transect surveys. Each area was sampled monthly resulting in an average of 208 km of census walks per area. This reached to a cumulative total of 2,490 km surveyed area. We found a great variation in bird and mammal density and biomass (Figure 1). The areas with the highest density of mammals (excluding Anchieta which has introduced mammals) was Ilhabela. However, Ilhabela has the highest population of the endangered jacutinga (*Aburria jacutinga*).

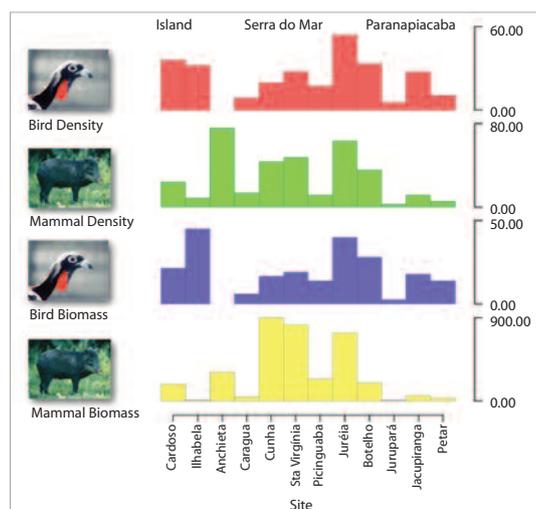
2. Developing DNA markers

We are using microsatellite markers for individual identification and to estimate the population sizes of elusive mammals. In the case of felids, we have microsatellites already described in the literature, but in the case of tapirs and peccaries, specific markers are not available, which are under development. We have already prospected and characterized 18 tapir microsatellite loci and initiated the prospection for peccaries. We have developed 18 molecular markers for tapirs. These markers have been examined and tested in some collected samples. About 30 dung sample were collected and stored in ethanol. The isolation of DNA markers of peccarids has been initiated. For felids, specific molecular markers are already described in the literature. Besides individual identification, these markers will provide the felid species identification. We have more than 40 felids faecal samples collected and we have already started to extract their DNA.

3. Top down effects on plant diversity

We have monitored the herbivory, trampling, seed predation and dispersal of two areas with distinct mammal abundances. Our preliminary results show that one area has 35-fold higher abundance of peccaries than the other one. This higher abundance has affected positively on trampling, and plant diversity. Areas with higher density of tapirs and peccaries have higher

diversity of seedlings than defaunated areas, suggesting key effects of these large herbivores on plant diversity.



Density and biomass of game birds and mammals in 12 Protected Areas in São Paulo State

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