# ANTEATERS ROADKILL IN THE COLOMBIAN ORINOCO: UNDERSTANDING THE PROBLEM, FINDING SOLUTIONS

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**RESUMO**

Vehicle collisions (VC) represent one of the main threats to anteaters (Myrmecophaga tridactyla - M.t. and Tamandua tetradactyla - T.t.) conservation in large portions of its distribution range. In the Colombian Orinoco there is a lack of information available on variables associated with anteater VC, and it is necessary to conduct studies that help road planners to improve mitigation measures. Considering this, we aimed to (1) estimate mortality rates in four road segments, (2) assess whether VCs are spatially clustered forming mortality hotspots, (3) evaluate the relative influence of related predictors on the spatial distribution of VC, and (4) contribute to mitigation of anteater mortality on roads through a standard underpass design. From 2014 to 2019 we conducted trips in four routes: Villavicencio-Yopal (VYR; 266 km), Yopal-Pore (YPR; 72 km), Yopal - Quebradaseca (YQR; 69 km), and Yopal - San Luis de Palenque (YSR; 69.7 km). Mortality rates per day and per day per kilometer for each species and route were calculated using SIRIEMA- Road Mortality Software. Roadkill hotspots were defined according to Ripley's K spatial distribution analysis and Kernel density method. A logistic regression was developed to determine which of the selected variables explains the anteater roadkill cause. Two independent categories were chosen and measured using R: Euclidean distance to covers (forest, crops, transformed, pasture, river and urban) and road characteristics (slope). We selected the model with low AIC, a P value less than 0.2 and a residual deviation close to degrees of freedom. With the support of the VYR Concessionaire, we made a classification of bridges and culverts present in the identified roadkill hotspots. Depending on their height and width, we selected only those with values greater than 2 m. A total of 15.342 km were traveled with 346 road-killed anteaters registered (36.1% for M.t. and 63.5% for T.t.). YPR was the segment with the highest roadkill rates for both species. We estimate a population annual loss up to 1130 M.t. and 2940 T.t. in the selected roads. 16 significant roadkill hotspots were found along the VYR 266 km. M.t. road-kills hotspots were related to forest presence, a low road slope and a higher distance to urban centers. T.t. hotspots were related to a higher distance to urban centers, a short distance to forest and a higher road slope ($P < 0.05$). Six bridges and 16 culverts were prioritized in the hotspots. In these structures we designed an underpass consisting in a lateral passage, accompanied by perimeter fencing on each side of the road. This design was approved by the Concessionaire and is currently in the contracting phase to be built. This study reveals that thousands of anteaters could be dying annually in the Orinoco region. Roadkill hotspots were grouped in forested areas probably because these zones provide quality habitat for these species and serve as movement corridors. Our results will help to understand and reduce the mortality of anteater and other species, and shows that an articulated work with different actors can bring concrete conservation benefits.

**PALAVRAS-CHAVE**: Colombia, Myrmecophaga tridactyla, Mortality, Road, Tamandua tetradactyla

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