



## Affordable and simple tools for monitoring impacts of Reduced Impact Logging on mammals in a FSC certified forest concession in Suriname

*Camera trapping and line transects are easy and cost-effective techniques to study the presence of mammals within a forestry concession. They provide insight in the impact of logging on biodiversity over time, which is a requirement for FSC certified concessions. These biodiversity monitoring techniques can be an answer to the constraints of money of the concession holders in developing countries.*

Tropical forests are under pressure of human activities such as agriculture, mining and logging. Environmental concern about the loss of biodiversity in logged forests has driven the development of forest certification, a market-based policy instrument assuring the consumer that the products are coming from well-managed forests. Forest Steward Council (FSC) certification is used worldwide with the aim to promote the sustainable use of forests for both companies and communities which manage the forests in compliance with the FSC Principles and Criteria (P&C). The P&C are created to improve the balance between social, environmental and economic interest.

The FSC was mainly developed to stimulate the sustainable use of the (tropical) forests in Africa, Asia-Pacific and South-America. However, more than 81 percent of the FSC certified forests are located in Europe and North-America because in developing countries the initial costs to become FSC certified are relatively high.

The FSC P&C request, amongst others, that forests have to be monitored to reveal the impact of logging on biodiversity. For certified concession holders it is important to have tools to effectively monitor biodiversity, meeting the budget and in-house capacity of the concession holder.

### **An affordable and simple biodiversity monitoring scheme**

Concession holders should take into account that any biodiversity monitoring scheme must be purposeful (conservation objectives), effective (connection between human activity and logging) and realistic (handling the constraints).

The monitoring scheme as presented in this Information sheet gives tools to study the impact of logging on biodiversity over time, is simple and at low cost and could be used as a guide for the concession holders to monitor biodiversity.



Overall, the monitoring scheme consists of several indicator species (i.e. birds, mammals, primates, dung beetles, ants, amphibians and reptiles) from a broad range of life characteristics. Compared to research focused on a single indicator species, a variety of indicator species makes it more reliable to measure the influence of Reduced Impact Logging (RIL) on biodiversity levels.

Part of the monitoring scheme aims at mammal species (Table 1). For the mammal species, camera trapping and line transects are simple and affordable non-invasive methodologies suitable to study the presence (abundance) of mammal species in the area.

**Table 1. Proposed monitoring framework to study mammal species.**

Method	Target Species Group	Target Habitat Type	Type of data produced	Minimum Sampling effort	Types of Expertise needed
Line transects	Small mammals	Easy assessable habitat type	Presence, density	At least 40 sightings of a single species though 60-80 gives better precision. Need at least 20 transects in each habitat type	Knowledge about small mammals to recognize signs
	Primates	Forest	Species inventory and richness, relative abundance, absolute density	20 km transects per habitat. Stratified sampling	Knowledge of primates, life characteristics and recognition of signs and on direct sight
Camera trap	(small), medium & large ground dwelling species	All habitat types	Species richness, relative abundance	350 trap nights per 100 km <sup>2</sup>	Experience with equipment, ability to identify species

### *Camera trapping*

Infrared-triggered cameras are a powerful and efficient non-invasive method to record mammal species in the forest. There are several reasons why, for example, within a relatively short time period it is possible to study most of the species present in the area. This field methodology is relatively simple, could be standardized and can be executed by (non-specialist) employees. Furthermore, it is a minor effort to collect data and the cameras can be kept in place for a prolonged period of months or easily installed in a new area. The analysis of the data can be done by employees of the company. A disadvantage of this methodology is that the cameras are only useful to study (small) medium and large ground dwelling mammal species, and an initial investment is needed to buy the necessary infrared triggered cameras. The number of cameras needed to study the presence of mammal species is depending on the forest area (km<sup>2</sup>) and availability of camera traps. For example, the terrestrial vertebrate monitoring protocol implemented by the Tropical Ecology Assessment and Monitoring (TEAM) network recommends placing 60-90 camera traps in a grid at a distance of approximately 2 km<sup>2</sup> throughout the study area, for at least 30 camera trap days. The Zoological Society of London (ZSL) recommends 350 trap nights per 100 km<sup>2</sup>. It is advisable to put the cameras in both the dry and the wet season.

### *Line transects*

Line transects provide the concession holder insight in the presence of mammal species within the area, either by physical observation or signs. For example, line transects could complement the camera traps by providing information about mammal canopy species (primates). The positive aspect of this methodology is that it is easy to implement, requires only local expertise, could easily be repeated multiple times and is cost effective. Nevertheless, on the downside the results can be biased. For example, soil type and litter layer in the area along with light penetration and weather could influence the process that signs (i.e. tracks, droppings) are left behind and preserved. Rain could wash away the tracks and lose sand or a thick litter layer restricts that tracks are being left behind. Furthermore, even with expert knowledge, it might be difficult to recognize signs for specific species. For mammal research it is recommended to implement multiple transects of approximately 500 - 1000 m in length located 1 km apart and parallel to each other. The total number of transects depends on the size of the area, however, at least 20 transects should be selected in each habitat type. The transects should be investigated multiple times to create at least 40 sightings of a single species. For primate research a total of 20 km transect length should be implemented per habitat. For the amphibians and reptiles it is recommended to measure 15-20 transects in each habitat type, of at least 200 m in length.

Compared to line transects, research revealed that camera traps are more effective at detecting ground dwelling mammal species. However, information obtained from line transects could complement the camera



trap data. For example, it provides additional information about the canopy species in the area. Furthermore, the concession holder could implement line transects to study other groups of species, such as birds, primates, amphibians and reptiles.

**Recommendations for the concessions holders**

FSC certified operations can use both camera trapping and line transects to monitor the presence of mammals within the concession. Both techniques are easy and cost-effective. Additionally, line transects can also be used to study the presence of birds, primates, amphibians and reptiles.



This Information sheet presents the findings of a MSc research by Maikel van Wezel, Environmental Biology student (Utrecht University), conducted in the first half of 2015. Facilitated by Tropenbos International Suriname and E-Timber Industry Suriname N.V. (ETS), this study was meant to evaluate and develop a potential monitoring protocol for concession holders in developing countries.

Camera traps and instructions were made available by Conservation International Suriname

The opinions expressed in this infosheet are those of the author and do not necessarily reflect the views of Tropenbos International.

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