**3.7 SCRIPT– Which indirect monitoring methods are adapted to monitoring large mammals?**

E – Indirect mammal monitoring methods are used when the animals themselves are difficult to observe.

G – When vegetation is dense as it is the case in forests for example, when animals are present in low density, or when a species tends to appear scarcely in the open…

E – Indirect counting approaches are essentially based on sampling techniques we already talked about in direct monitoring, and survey plans use sampling units such as the quadrats you are familiar with now.

G – Of course, line-transects can also be used, as they are axes of progression along which the indicators are counted.

E – Belt transects can also be used: they are based on the same principle but the counting is done over a determined surface on both sides of the progression axis.

G – There are several indirect inventory methods depending on the species that is being studied, on the environment’s physical characteristics, on indicators that are being measured and the resources at hand. What we are looking for are signs or indicators of the animal’s presence.

E – To monitor large African mammals, the most commonly used methods are as follows:

• monitoring footprints;

• monitoring tracks;

• monitoring dens and burrows;

• monitoring nests;

• monitoring faeces;

• and finally, monitoring noises (especially when monitoring lions);

G – The footprint counting method can be used when the substrate allows it (as it is the case in sandy regions for example). Monitoring footprints can be done daily, but after each passage, do not forget to cover the signs already recorded.

E – The analysis of footprints helps to estimate the walking direction and the use of the habitat, the size, the gender and even at times, the age of the individuals.

G – An estimation of the population density (D) can then be done by a simple formula combining the density of the tracks recorded and the average size of the considered species’ habitat.

E – The track recognition method helps, in some cases, to recognize an animal and to monitor it. Recognition can be done by sampling scars, sizes, missing claws etc. For example, this technique has been used to monitor panthers in the Namibian desert. It can also be used for the individual monitoring of elephants.

G – The footprints of a species can vary, depending on if they are front or back paws, depending on the age and the gender. It is therefore advised to combine direct observations of the animal and its tracks. Ideally, in each region, it is recommended to set a baseline collection using plaster moulds or 3D photographs.

E – Counting burrows and dens consists in monitoring animal resting or reproductive sites. It isn’t always simple because the number of individuals in the burrows may vary, they may be abandoned or occupied by another species. For example, aardvark burrows can be occupied by warthog, hyena, mongooses etc.

G – On the field, this method consists in distinguishing the number of abandoned burrows, occupied by the studied species, occupied by other species as well as the number of individuals per occupied burrow. To clarify these questions, it is advised to combine this technique with the identification of tracks at the burrow entrance.

E – The faeces monitoring method is commonly used when monitoring elephants. It consists in counting all the dung heaps in the sampling area where units are often made of quadrats or transects.

G – Each observed dejection is classified in one of the 5 age categories defined by specialists, going from very fresh to almost completely decomposed.

E – Only relatively fresh droppings are to be considered in the mathematical estimates of dejection density. Thereby, droppings that are too decomposed are considered “disappeared”.

G – There is a relatively simple relation between the elephant density (E), the number of droppings produced by elephant per day (Y), the dropping decomposition rate (r) and the dropping density (D). This gives an estimation of the number of elephants present in the zone.

E – The nest counting method is very much used when monitoring certain primates, Inza will share more about that. It consists in counting the nests in the sampling area where the units are often quadrats or transects.

G – Again, there is a relation between the nest density (N), the average size of nest groups, the nest degradation speed (V) and the density of chimps (C).

E – The method using sounds is essentially used when monitoring lions. It consists in recording the sounds at set times, separated by a minimal interval of 13 km in order not to recount the same animals. In this way, you obtain an estimate of the minimal number of the lions on the surveyed site (N).

G – Finally, you can also use sensors and captors to detect indirectly the animals. It could be acoustic sensors, or camera trap that take pictures or make movies, as we’ve already seen it.

E – That way, you can follow the animal species of your park without having to be on the ground, especially when your cameras are connected so that you can download the data from your office.