How to choose a location sampling interval in telemetry studies on animal home ranges

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The delineation of animal home ranges extends the understanding of fundamental ecological and behavioural aspects of animal biology, such as resource selection, predator-prey relationships, competition and mating and social systems. It is therefore widely used in studies on various species and in many different fields, such as in conservation and management.

An estimation of a home range can easily become biased by an inappropriate location sampling protocol, causing false biological conclusions to be drawn, in which context the relevance of autocorrelation and the time to independence (TTI) between locations have received much attention.

The sampling regime in 223 peer-reviewed articles on home ranges or related topics published in 2006-7 was reviewed, revealing the need for additional guidance and alternative methods to estimate a suitable location interval, as many studies employed sampling protocols which might lead to biased location sampling.

A new method to calculate a minimum sample interval based on behavioural characteristics of the species in question, the BBTTI (Behavioural Biological Time to Independence), is presented. It is compared to other available methods, the statistical TTI and the traditional biological TTI (BIOTTI), by testing their performances on kernel density estimated utility distributions (UD) calculated from real animal location data obtained on American mink (*Neovison vison*).

The BBTTI provided the best results and outperformed the statistical TTI in some cases, but both produced very consistent outcomes. The traditional BIOTTI, most frequently employed today, produced highly variable results and should be used with caution.

General recommendations for sample interval choices in telemetry studies on home ranges and utility distributions are suggested, which should assist in sample protocol design and data processing and facilitate standardized sampling methods which are crucial for calculating home ranges used for comparison and further analysis.

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