Ann. Zool. Fennici 53: 52–54 ISSN 0003-455X (print), ISSN 1797-2450 (online)
Helsinki 8 April 2016

A comment on Horcajada-Sánchez and Barja (2015): a cautionary tale about left truncation and density gradients in distance sampling

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Received 22 Sep. 2015, final version received 21 Dec. 2015, accepted 29 Dec. 2015

Marques, T. A. 2016: A comment on Horcajada-Sánchez and Barja (2015): a cautionary tale about left truncation and density gradients in distance sampling. — *Ann. Zool. Fennici* 53: 52–54.

Distance sampling is one of the most widely used methods to estimate density and abundance of wild populations. Horcajada-Sánchez and Barja (2015) presented a critical assessment of two field methods to implement distance sampling surveys of roe dear, "surveys on foot in the evening and nocturnal surveys by car". In particular, they concluded that line transect distance sampling surveys conducted from a car at night would outperform distance sampling on foot by day. However, they noted that for nocturnal driven surveys, left truncation was required due to "an imbalance in the detection function at zero distance". The recommended method produced density estimates more than double those of foot surveys. While I agree that such evaluations of different techniques are desirable and lead to valuable insights, I believe that the justification for left truncation of the nocturnal driven transect data is invalid and its use produces a potentially biased population estimate.

The key question lies with the fact that left truncation should only be used when there is proper justification to do so, and not simply in an *ad hoc* manner to make a detection function look better when the expected pattern of decreasing distances is not observed. In fact, by doing so, one will probably be ignoring a key assumption violation. When such an assumption violation occurs, then at best data analysis can be replaced by *data salvaging*. What this means is that there is no longer an optimal way of implementing the analysis, and the analysis becomes dependent on subjective choices aiming to minimize the effects of the assumption violation. In particular, the model best fitting the data will not necessarily lead to the least biased estimates. Left truncation will most likely exacerbate the problem one is actually trying to solve. To understand why, we need to go back to the basics of distance sampling.

To derive unbiased estimates from distance sampling surveys one requires that a sufficient number of transects are placed at random, independently of the animal population, in the area inferences are required for. This is key to ensure that the distribution of all distances, detected or not, is known, which is paramount to derive the density estimators involved (Buckland *et al*. 2015: 12). Three other assumptions are required: (1) animals on the line are detected with certainty, (2) distances are measured without error, and (3) animals are detected at their initial loca-