

TOWARDS THE USE OF DISTANCE SAMPLING TO MONITORIZE MOUNTAIN UNGULATES NUMBERS

Jesús M. Pérez^{1a} and Russell Alpizar-Jara^{2b}

¹Departamento de Biología Animal, Biología Vegetal y Ecología, Universidad de Jaén,
Campus Las Lagunillas, s.n., E-23071, Jaén, Spain

²Centro de Investigações em Matemática e Aplicações, Departamento de Matemática,
Universidade de Évora, Rua Romão Ramalho, 59, 7000-671, Évora, Portugal

Abstract

Many management actions involving mountain ungulates require unbiased and precise estimations of their numbers. Topography, among other factors, makes difficult the use of direct methods and to assess the effective area sampled. On the other hand, social behaviour of animals increases the risk to violate the assumption that observations must be independent events. This could be avoided using the group or cluster size as a covariate and estimating density of animals through the density of clusters. In this paper we revise the increasing potential of Distance Sampling methodology to estimate mountain ungulate populations. We address different problems which compromise some of the assumptions and discuss several topics concerning the importance of assessing effective area sampled, estimation of $g(0)$, and model selection when attempting to adapt the use of Distance Sampling to a three-dimensional scenarios, like mountainous habitats and ungulate populations.

Introduction

Line transect sampling evolved from strip sampling (plot sampling), which assumes that all objects within the strip are detected. Distance sampling methodology allows to relax the critical assumption of probability of detection being equal to 1 within a plot and uses the number of detected objects (animals or groups of animals, pellets, nests, sound calls, and so on) and the perpendicular (or radial) distances to a line transect (or point) (figure 1). This approach is specifically used to produce less biased estimates of density than those obtained

^a E-mail address: jperez@ujaen.es

^b E-mail address: alpizar@uevora.pt