Mammalian Biology 91 (2018) 23–29

Contents lists available at ScienceDirect

Mammalian Biology

journal homepage: www.elsevier.com/locate/mambio

Original investigation

Evaluation of methods to monitor wild mammals on Mediterranean farmland

Ana M. Valente[a,b,*], Héctor Binantel[c], Diego Villanua[d], Pelayo Acevedo[a]

[a] Instituto de Investigación en Recursos Cinegéticos (UCLM-CSIC-JCCM), Ronda de Toledo 12, 13071 Ciudad Real, Spain
[b] Departamento de Biologia e CESAM, Universidade de Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal
[c] Departamento de Ecología Evolutiva, Museo Nacional de Ciencias Naturales (CSIC), José Gutiérrez Abascal, 2, 28006 Madrid, Spain
[d] Gestión Ambiental de Navarra (GAN-NIK), Padre Adoain, 219 bajo, 31015 Pamplona, Navarra, Spain

ARTICLE INFO

Article history:
Received 22 January 2018
Accepted 20 March 2018
Handled by Emmanuel Serrano
Available online 21 March 2018

Keywords:
Camera trapping
Indirect index
Species richness
Spotlight counts
Wildlife monitoring

ABSTRACT

Managers have, over the years, searched methods with which to monitor wildlife populations that will have the best cost-performance balance for each case scenario. Monitoring techniques are of particular importance when attempting to attain either population density estimates or species richness values, since they enable management decisions to be made. It is, therefore, imperative to assess the capability of the methods employed to detect a wide range of species as a means to evaluate their cost-efficiency. Seventeen mammal species on Mediterranean farmland were sampled using three monitoring methods: camera trapping, spotlight counts and indirect indices based on track and faeces counts. The method able to detect the greatest number of species with the best cost-performance balance was the indirect index. There were no significant differences among seasons when applying the same sampling methodology. Studies analysing methods with which to monitor wildlife populations are in great demand in Europe, where attempts are gradually being made to standardise protocols, reduce field effort and costs, and maximise data potential and data gathering over the years. Our manuscript contributes towards finding a cost-effective method and a standardised field protocol to be applied in Mediterranean habitats.

© 2018 Deutsche Gesellschaft für Säugetierkunde. Published by Elsevier GmbH. All rights reserved.

Introduction

All wildlife management strategies require knowledge and monitoring of the population size in order to assess the effects of management actions on the population dynamics (Yoccoz et al., 2001), including game management (Delibes-Mateos et al. 2008), define conservation criteria for threatened species (Garrote et al. 2011) and/or understand the epidemiology of relevant pathogens (Acevedo et al. 2007, Gortázar et al. 2006). It is not usually feasible to perform a complete census of a wildlife population, and managers (in a broad sense) rely instead on estimations of population abundance (e.g. Engeman et al. 2013). Monitoring population abundance is, therefore, mandatory for every management plan in order to establish comparisons among populations and/or assess the dynamics of the population over the years (Battersby and Greenwood 2003, Valente et al. 2014). It should, however, be borne in mind that the management actions applied to a given species also have effects on other species, and the design of population monitoring programs should, therefore, ideally be sufficiently comprehensive to obtain information for all species potentially related to the target one (Pollock et al. 2002).

The choice of the method should be made by bearing certain significant aspects in mind, such as the logistical and financial resources available, the ecology of the studied species, the periodicity of the sampling and the management questions that need to be addressed (Mayle et al. 1999, Pollock et al. 2002, Valente et al. 2014, Wilson and Delahay 2001). The methods used to estimate population abundance can be broadly classified as direct and indirect. When using direct methods, the observer has direct contact with the animal being monitored (Focardi et al. 2002, Lyra-Jorge et al. 2008), while indirect methods are based on presence signs such as foot tracks and, more commonly, pellet groups (Lyra-Jorge et al. 2008, Valente et al. 2014, Virgós and Casanovas 1999). Direct methods, such as spotlight counts, have the main advantage of providing information about the sex-ratio, age structure and behaviour of the population being studied (Mayle et al. 1999). However, indirect methods are preferred when working in forested areas, with elusive species, or with populations at low densities (Marques et al.

* Corresponding author at: Departamento de Biologia e CESAM, Universidade de Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal.
E-mail addresses: anamvalente@ua.pt (A.M. Valente), hecbince@hotmail.com (H. Binantel), dvillani@gan-nik.es (D. Villanua), pelayo.acevedo@gmail.com (P. Acevedo).

https://doi.org/10.1016/j.mambio.2018.03.010
1616-5047/© 2018 Deutsche Gesellschaft für Säugetierkunde. Published by Elsevier GmbH. All rights reserved.

2001, Tellería 1986). One of these two types of methods is camera trapping, which has the advantages of both classes of methods – we can see the animals but this does not require the presence of an observer (Garrote et al. 2011, Rovero and Marshall 2009).

The methods most commonly used to monitor wildlife species in general, and wild mammals in particular, are (e.g. www.aphaea.eu/cards/species/): spotlight counts, indirect indices and camera trapping. The selection of the best methodology with which to monitor wildlife on extensive Mediterranean farmland is not straightforward, although farmland represents an important percentage of the world's surface (Foley et al. 2005, Ramankutty et al. 2008) and constitutes one of the habitats with the greatest biodiversity in Europe (Altieri and Nicholls et al., 1999, Krebs et al. 1999), thus making it essential to correctly define and standardise population monitoring protocols. Despite the fact that most of the methods have been comparatively assessed for target species (Rovero and Marshall 2009, Wilson and Delahay 2001), it is now necessary to evaluate the capacity of each method to detect the whole community of species in order to evaluate their cost-performance balance. Past studies, such as Acevedo et al. (2008) and Putman et al. (2011) dealt with ungulate populations reviewing and comparing different methods taking into account several aspects of the methods, as costs, difficulty, suitability for low/high densities, among others, which can be very useful when designing a monitoring project. However, no studies were carried out on a broad set of species and on farmlands. In this context, the aim of this study was, therefore, to evaluate simultaneously the three methods most frequently used to monitor wildlife population abundance (track and faeces sampling, spotlight counts and camera trapping) in a Mediterranean farmland habitat, in order to assess their performance as regards detecting the whole wild mammal community and to analyse the variations in species detectability throughout three different seasons: winter, spring and summer.

Material and Methods

Study Area

The study area (UTM 10 x 10 km - 30TWN91) is located in Navarra, a region in the north east of the Iberian Peninsula (Fig. 1).

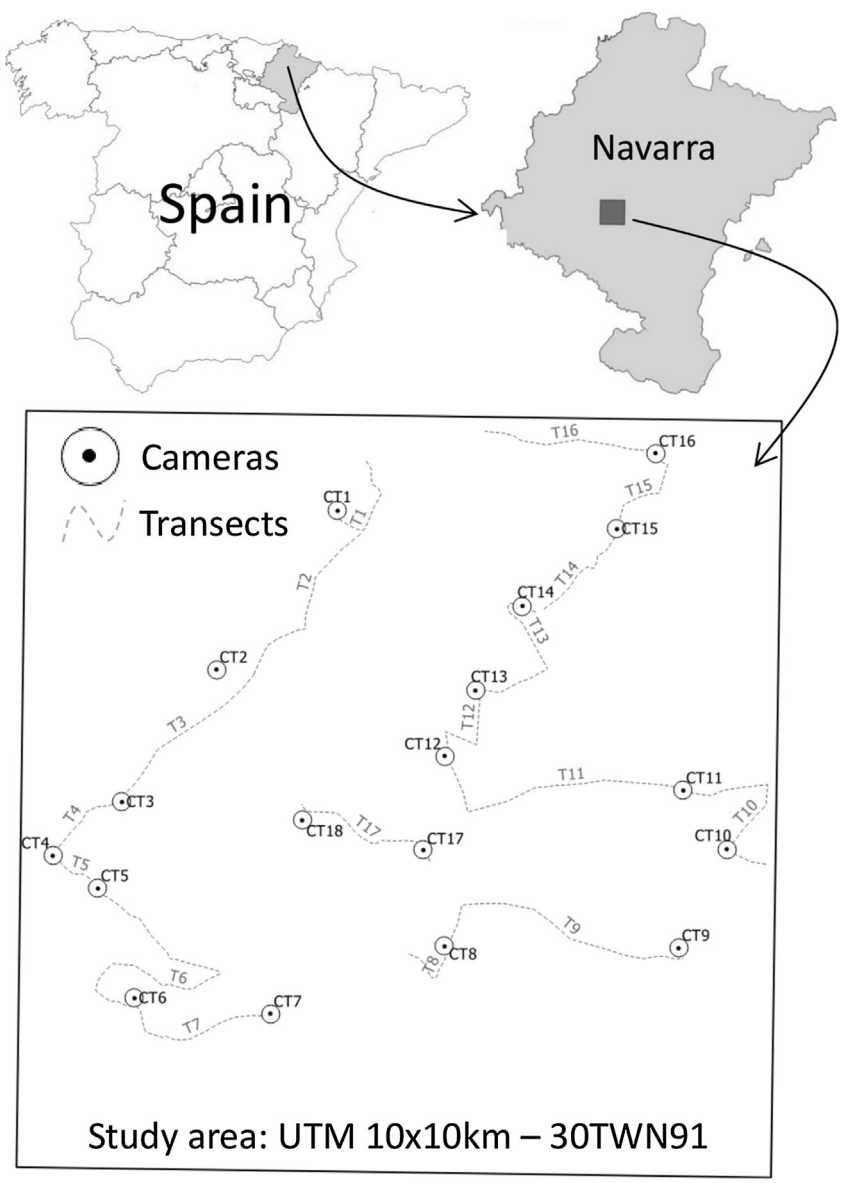

Fig. 1. Location of the study area in the Iberian Peninsula and in the Navarra region. The locations of the camera traps (coded from CT1 to CT17) and the transects (coded from T1 to T17) are also shown.

Download English Version:

https://daneshyari.com/en/article/8475574

Download Persian Version:

https://daneshyari.com/article/8475574

Daneshyari.com