

Dear Editor,

Thank you for the positive evaluation of our manuscript and the helpful suggestions to improve it. In the revised version we have clarified several issues that were pointed out by the reviewers. Below we provide detailed answers for all points raised by the reviewers. We considered each of their comments in details and followed suggestions and made the required changes in most parts.

## Responses to the reviewers:

### **Reviewer 1 - Matthew Grainger:**

#### General Comments

This is a well written and interesting manuscript. There are a few minor issues that need to be addressed. In addition, the R code needs to be better presented so that I (or anyone) can recreate the analysis.

#### Specific comments

##### *Comment 1:*

Line 100 & Line 102: Be consistent – “Fig.1” or “fig.1”

##### *Response 1:*

We now use the "Fig.x" typology throughout the paper.

##### *Comment 2:*

Line 118: “...martens (*Martes foina*), Free-roaming dogs (*Canis lupus familiaris*) and common buzzards (*Buteo buteo*).”

##### *Response 2:*

We have modified the sentence as suggested (lines 120:122)

##### *Comment 3:*

Line 142: “as little as possible”

##### *Response 3:*

We have modified the sentence as suggested (line 145)

##### *Comment 4:*

Line 146: Can the authors expand on how the birds from the wild were distinguished from the farmed birds.

##### *Response 4:*

We have clarified in the text how to recognize a farm bird to a wild bird by the condition of its plumage (lines 149-152).

*Comment 5:*

Line 195: Using “Rules of thumb” in statistical modelling is likely to lead to disasters! Please assess overfitting of the models.

*Response 5:*

Thank you for your comment. To assess overfitting, we have now used the cross-validation method for the R package "caret". The text has been modified accordingly (lines 200-201).

*Comment 6:*

Line 252- 256: My Latin is not great... but I guess you had some problems with the LaTeX template.

*Response 6:*

We are sorry for this. We do not know why this text was present in the manuscript. This paragraph has now been removed from the text.

*Comment 7:*

Line 127- 129: Do we need these abbreviations? It gets a little confusing.

*Response 7:*

We agree with you. We have removed the abbreviations "H group, HW group and W group" and replaced them with herbaceous, mixed and woody linear features respectively.

*Comment 8:*

Figure 2- What is the line on the plots here? Are these fitted lines from the model. The relationship between Road density and Home Range seems a little tenuous.

*Response 8:*

Yes, the line was fitted from model averaging of the top models. We have modified the legend to make it easier to understand.

Indeed, the relationship between road density and home range size is tenuous, as shown by the confidence interval of the estimate, which is close to zero (table 2). With a larger sample, we could judge the robustness of this result. We mentioned the weakness of this relationship in the discussion (lines 393-394).

*Comment 9:*

Table 1/ Table 2 – what was the global model fit?

*Response 9:*

The global model has 19 degrees of freedom, a log-likelihood of 30.2 and an AIC of 108.5 which give a delta of 15.5 with the “best” model.

*Comment 10:*

Line 305 – how many of these were determined by the function in nestR and how many were observed?

*Response 10:*

Thank you for this request for clarification. This information has been added to the text (lines 308-309).

*Comment 11:* R code

The R code is not reproducible and needs to be edited with reproducibility in mind in order to allow readers/reviewers a better understanding of the analysis choices and approaches.

For example –

· Do not use `setwd()` when sharing code (or even in your own work) see <https://www.tidyverse.org/blog/2017/12/workflow-vs-script/> for details of why not. I use RStudio Projects and/or the `here` package to help set paths that can be reproducible.

*Response:* Thank you for the advice. We have adapted our scripts accordingly using RStudio Projects.

· In script 1.Monthly Home Ranges after the first for loop I get an error: Error in `rgdal::writeOGR(hr95, dsn = paste(subset_kb$id_fix[1], sep = "_", : layer exists, use a new layer name`  
In addition: Warning messages: 1: In `amt::make_track(subset_kbmonth, x_, y_, dayofmoni = dayofmoni, : it looks like you used `CRS()` to create the crs, please use the ESPG directly.`2: OGR support is provided by the `sf` and `terra` packages among others 3: OGR support is provided by the `sf` and `terra` packages among others

*Response:* The code has been corrected and the problem fixed.

· What is happening in the code when individuals are assessed? (line 121) – Add comments to help the reader understand what you are doing and why.

*Response:* We did not understand your question. However, we have improved the annotation of all the code to make it easier to understand.

· Make sure that the code can run on your computer and can also run on “my” computer (someone other than you).

*Response:* Following your advice, we tested the script on other computers and the code works.

**Reviewer 2:**

General comment

This work aims to determine the importance of landscape heterogeneity and linear features on the spatial distribution of red-legged partridges. Data on red-legged partridges was obtained via remote tracking with GPS devices. based on movement data of tagged birds. Monthly and breeding home range sizes are assessed in relation to linear features density and a habitat selection during the breeding season is then carried out focussing on linear landscape features.

This work has merit, I found it well written, the study well designed (although with a small sample size, see below) and the statistical analysis sound.

My main concern with this paper is the small sample size, particularly for the breeding habitat selection analysis. I would therefore suggest for the authors to make it particularly clear in the discussion section that the results dealing with the breeding habitat selection should be taken into consideration with caution due to the small number of animals considered in the analysis, which may not be representative of the population.

*Response:*

Thank you for your comment. Regarding our small sample size, we have added the resulting limits of the study into the discussion (lines 411-415).

Specific comments

*Comment 1:*

Line 21 – “In Europe, management prescriptions serve to increase heterogeneity by the creation of these seminatural and linear features which are not being used primarily for agricultural production” – this is an overstatement, only some management prescriptions are used to increase heterogeneity.

*Response 1:* We have corrected this sentence based on your comment (line 21).

*Comment 2:*

Lines 111-112 – Here the authors mention that the birds were not differentiated according to one of the two areas considered for the study due to the similarities of these areas. Still would this be worth testing? A random factor considering the id of the area could be used when running the analysis.

*Response 2:*

As you pointed out, the study sample size is small. Consequently, we decided not to add the site effect as a random effect so that the models would converge correctly. But it is true that this is a limit of our study and we have taken this point into account in the discussion (line 411-413).

*Comment 3:*

Line 118 – a reference is missing at the end of line 118

*Response 3:*

The reference was added (line 122)

*Comment 4:*

Lines 126-132 – was a width considered when classifying the different linear features?

*Response 4:*

No, the width was not considered because we do not have recorded this data. However, it is true that this characteristic can affect their attractiveness. This is discussed in the discussion section (line 415-417).

*Comment 5:*

Lines 137-138 – This sentence states that distance to linear features enables considering the different biological functions these features can have on the species, namely refuge, feeding and movement. I would suggest removing this content from the methods and add it to the introduction since linear features are a central topic of the paper.

*Response 5:*

In line with your comment, we have removed this sentence from the "material and method" section and explained our choice to work with linear distance in the introduction (lines 91-95).

*Comment 6:*

Line 158 – How where erroneous locations screened?

*Response 6:*

Erroneous locations were detected using individual movement characteristics. This method is well recognized and described in the article by Bjornerras et al. 2010 (cited line 163), so we think it unnecessary to explain it in detail here.

*Comment 7:*

Line 164 – It wasn't clear for me how you considered a bird nesting. When birds were located three times in the same place, do you mean that the birds were observed in the field, or do you refer to repeated GPS locations? Could better use of GPS data collected with 1 hour interval not be used to infer incubating behaviour?

*Response 7:*

Thank for you comment.

In 2018, a bird was considered to be incubating when the field agent identified it 3 times successively at the same location. The interval between two locations was around 3-4 days. Next, when the bird was no longer on the nest, either because its incubation period had ended or because incubation had failed, the field agent visually located the nest and recorded its location. So, we have a precise location of these nests. In 2019, our team was smaller and we were unable to track breeding birds properly. We therefore used GPS locations and the trajectories derived from them to locate the nests. We verified the effectiveness of this method by also using it to detect nests in 2018 and comparing it with field data. We have clarified this in the text (lines 166-174).

*Comment 8:*

Line 232 – At the end of the sentence a reference is missing

*Response 8:*

The reference was added (line 239)

*Comment 9:*

Lines 252-256 – this paragraph must be an error

*Response 9:*

We are sorry for this. We do not know why this text was present in the manuscript. This paragraph has now been removed from the text.

*Comment 10:*

Line 358 – replace “offer a good safety” by “provide cover”

*Response 10:*

The sentence was corrected (line 363)

*Comment 11:*

361-365 – A question arises when reading this sentence which is: until what density of hedges is it favourable for the species? Would we expect that in very high density of hedges for the habitat to be as attractive for the partridges?

*Response 11:*

Thank you for your comment. Increasing hedgerow density could actually benefit the red-legged partridge for two reasons:

- by increasing resources: shelter, nesting sites, food, etc.
- by diluting predation pressure on these linear elements.

We have added this element to the discussion (lines 368-370)

However, we have no data enabling us to judge the optimal density of hedges for the red-legged partridge. In the context of our study, as semi-natural elements are rare, the challenge is rather to increase their density to support a minimum of biodiversity in these environments

*Comment 12:*

Line 377 – Replace “the regular discovery of red-legged partridges killed on the roads by collision with vehicles” by “frequent roadkill events”

*Response 12:*

The sentence was corrected (line 384)

*Comment 13:*

Lines 381-382 – Could the pattern of nests being closer to roads be related to the presence of limited favourable nesting habitat concentrated closer to roads?

*Response 13:*

We fully agree with this hypothesis, and it was already mentioned later in the discussion (lines 431-433). But for a smoother reading, we have added a sentence (lines 391-393).