**January 30, 2019.**

**OA#18731 - “A 3-YEAR POPULATION STUDY OF *Guerlinguetus brasiliensis ingrami* (RODENTIA, SCIURIDAE) AT THE SERRA DA BOCAINA NATIONAL PARK, RIO DE JANEIRO STATE, BRAZIL”**

**Answers to comments made by reviewers**

**Comments from reviewer #A:**

**C1: Demography encompasses the study of the size, structure, and distribution of populations, and spatial or temporal changes in them in response to birth, migration, aging, and death.**

**I do not agree that the authors have a demographic study of the species but rather estimates of size and population density. It is important to review the use of this term throughout the MS text.**

**Authors:** We agree. We changed the term “demographic study” to “population study” or “population parameters” throughout the manuscript, to avoid misunderstanding. We note, however, that we estimated not only abundance and density, but also survival and recapture probabilities, which are demographic parameters.

**C2: I do not agree that this is a good justification. In fact, it is very weak as an argument. The species is easily detected during distance sampling and there are some studies that estimate the population size through this method. Therefore, not being easily captured by a method does not prevent other methods from being applied to estimate the population size of the species.**

**Authors:** We agree that population sizes could be estimated through distance sampling. However, we reinforce that this method cannot estimate other population parameters, such as survival and capture probabilities, which require actual capture of individuals.

**C3: The authors only evaluated population size and density!**

**Authors:** We respectfully disagree, as we also estimated survival and capture probabilities.

**C4: Please provide values to quantify the amount of variation or dispersion of a set of data (i.e. SD or SE).**

**Authors:** We added the SE in the abstract. The text “Population size estimates ranged between 3.2 and 51.3 individuals based on POPAN (…)” was modified to “Population size estimates ranged between 3.2 ± 2.4 (mean ± SE) and 51.3 ± 15.0 individuals based on POPAN (…)”.

**C5: Please provide values to quantify the amount of variation or dispersion of a set of data (i.e. SD or SE).**

**Authors:** We do not have information on SD or SE for densities, as they were estimated only considering the mean population size.

**C6: I suggest removing this part, since the study will not evaluate home range of the species.**

**Authors:** We agree that our study does not evaluate home range of the species. However, we believe this is useful information for the readers, both to understand why we grouped data from all areas for the analyses, and also because we used home range estimates to estimate sampled areas through the boundary strip method.

**C7: So the authors want to say that using distance sampling may not be a suitable method for the species? With this sentence, it was this understanding ...**

**Authors:** We presented the existing contrasting information between distance sampling and mark-recapture study to contextualize our investigation. It is not clear why those results were so different; maybe it is because of different methods, or maybe because the studies occurred in different environments.

**C8: What about the minimum distance between sites?**

**Authors:** We presented only the maximum distance to justify grouping all data as representing one single population. We believe the minimum distances are uninformative in this context, as transects were not analyzed separately. We also note that Fig. 2 shows the positions of all transects.

**C9: Then the distribution of the traps was alternating between ground and understory? What do authors mean with “either”… Please reformulate this sentence for better understanding.**

**Authors:** We agree and corrected the sentence. The text “Each station had either a Tomahawk® trap (30x9x9 cm), placed on the ground, or a Sherman® trap (31x8x9 cm) set in the understory at 1.5–2.0 m above ground.” was corrected to “A Tomahawk® trap (30x9x9 cm) was placed on the ground in odd points, and a Sherman® trap (31x8x9 cm) was set in the understory at 1.5–2.0 m above ground at even points.”.

**C10: Why only in the first two sampling occasions? Is there any reason for this?**

**Authors:** Yes. Unfortunately, most structures that suspended Sherman® traps into the canopy were stolen, and from the third sampling session these ten livetraps were also set in the understory to keep sampling effort for arboreal species constant between sessions.

**C11: I do not understand the reason for differentiating the baits between traps! It does not make any sense! Why authors did not use the same bait in both traps?**

**Authors:** Some baits, such as banana, are more attractive to arboreal species than the use of banana combined with other ingredients, as some previous studies have shown (Loretto 2012). Thus, we used different baits in different strata of the forest, but the use of different baits was standardized between traps, trails and sampling sessions. Thus, we believe that this is not a problem for the objectives of the present study, which are to estimate population parameters for the whole population, rather than trap-specific parameters.

**C12: This sentence is not necessary, unless the authors used this information in some analysis. Which I believe will not be the case.**

**Authors:** We changed the text“All captured specimens were identified to the genus or species level, sexed, weighed using a spring balance, measured (head-body and tail lengths), and marked with a numbered ear-tag at first capture.” to “All captured specimens were marked with a numbered ear-tag at first capture”.

**C13: Again, I believe this is not the case of the target species of this study. Please remove and include only what is necessary to understand the results of the present study with the squirrel.**

**Authors:** We changed the text **“**Unidentified specimens or specimens that died in the live traps were collected, prepared, and deposited at the Museu Nacional/Universidade Federal do Rio de Janeiro (IBAMA/MMA process no. 02001.003937/2008-18, authorizations no. 248/2013 and 610/2015).” to “Specimens that died in the live traps were collected, prepared, and deposited at the Museu Nacional/Universidade Federal do Rio de Janeiro (IBAMA/MMA process no. 02001.003937/2008-18, authorizations no. 248/2013 and 610/2015).”.

**C14: Probability of capture?**

**Authors:** We changed “catchability” to capture probability.

**C15: Why did not the authors make models according to Robust Design? I think it's the model that fits best in such a long study period. I do not understand why POPAN was chosen.**

**Authors:** We did not use Robust Design because this model requires a substantial amount of data, which are commonly unavailable for many small mammals. Although the study design would theoretically fit in the Robust Design, individuals were not recaptured many times during each capture session. Recapture information is essential for estimating parameters from this model, as it combines both an open population model between sessions and a close population model within sessions.

**C16: I do not see how this relates to the study aims.**

**Authors:** We have decided to keep the information in the text, as it characterizes the study population in relation to the size of the individuals analyzed.

**C17: A standard error so high! This is due to the number of samples being so small. It may not be possible to make such estimates with a small number of individuals in three years of study. I understand the importance of having an estimate, but simply ignoring the fact of the small sample size, would be to force a result.**

**Authors:** We did not ignore the fact of the small sample size, otherwise we would have used the Robust Design which is much more data hungry that the model we used. We were aware of our data limitations and we accounted for those, but we still believe we can provide useful information due to the lack of data of this type for this species.

**C18: So, the conclusion would be that distance sampling would be more appropriate to evaluate the population of this species. Right? Sample sizes for distance sampling are always higher than when using live-trap. Therefore, perhaps live-trap is not the best method for this species. Despite being a small mammal, not always live-traps is the best method!**

**In this context, this final argument and the comparison of the results obtained in this study with the results obtained in other studies with distance sampling ends up overturning the argument that there are not many studies with the population of Guerlinguetus because the species is not frequently captured. Do the authors not think this goes against the initial argument in the introduction?**

**Authors:** We appreciate your comment, but our intention in this study was not to compare methods (distance sampling x live traps). In this paragraph we only emphasize the method that each previous study used because differences in density estimates between studies can be due to the use of these different methods, among other possible factors.

**C19: The english must be revised!!**

**Authors:** We reviewed the English of the entire manuscript.Please note thatthe term “catchability” is used in the MARK book (Gentle Introduction) in chapters 5 and 12. However, as we explained previously, we removed this term of the manuscript, to make the text clearer.

**1) Does the title adequately reflect the content of the manuscript?: I do not agree that the authors have a demographic study of the species but rather estimates of size and population density. Demography encompasses the study of the size, structure, and distribution of populations, and spatial or temporal changes in them in response to birth, migration, aging, and death. The authors do not go beyond to be considered a demographic study. They focus on presenting estimates of population size and density.**

**Authors:** As we explained in a previous response, we agree with the comment and changed the title (and also the body of the manuscript) accordingly.

**2) Is the manuscript a relevant scientific contribution to ecology?: Yes, the MS presents interesting results but should be structured differently. Perhaps the MS should be reduced and be more precise in presenting the estimates and proposing new directions for the study of the species.**

**Authors:** We believe that the directions for future studies are already in the last paragraph of the manuscript. We also believe the manuscript size is adequate, since the text is concise and within the format rules of the journal.

**3) Does the summary present the main idea of the manuscript and its objectives and main results and conclusions?: Yes.**

**Authors:** Ok.

**4) Are the keywords pertinent and different from the words used in the**

**manuscript title?: Yes.**

**Authors:** Ok.

**5) Does the introduction present the theoretical/empirical content in which**

**the manuscript topic is inserted?: Yes, but it could be reduced.**

**Authors:** We believe that the manuscript size is adequate, since the text is concise and within the format rules of the journal. Also, we justified in a previous response why we did not remove from the text the sentences regarding home ranges.

**6) Are the methods adequate and clearly presented? : I believe that the authors should improve the description of sampling for a better understanding of the reader. Also, I do not know if I agree with the type of model used. The sample size is quite small to get good estimates and the most suitable model might be Robust Design.**

**Authors:** As we detailed above, Robust Design is not the most suitable model precisely because of the small sample size. We believe we used the most suitable model for the data available.

**7) Are the results, discussion and conclusion clearly presented and do they correctly address the objectives of the study?: Yes. But again, the authors should better construct the MS in a way that is more objective and structured better in order to present an estimate and propose new directions for studies with the species.**

**Authors:** We believe that the directions for future studies are already in the last paragraph of the manuscript.

**8) Are all the figures and tables essential and self-explanatory?: Yes.**

**Authors:** Ok.

**9) Are the references pertinent and up-to-date?: Yes.**

**Authors:** Ok.

**10) Final Considerations:: Although MS does present a good idea for a species that in fact we do not have so much focus on, I can not recommend for publication. I believe that the structure as MS was proposed does not match the sample size to make inferences about the population of the species. This is clearly noticed with the SE size of the estimates. Perhaps the authors would benefit from restructuring the MS in a way that brings the estimates, but that the focus is also to review what already exists about the species and with that propose new directions for the knowledge of the species.**

**Authors:** We thank all comments made by the reviewer, which have helped improve the quality of the manuscript. However, we believe that the manuscript brings a new contribution to the knowledge of the ecology of the species and that we used analyses that were adequate to the sample sizes we had. The analyses we used are clearly presented and justified in the text, and we think our interpretations are correct and provide insightful information for future studies.

**Comments from reviewer #D:**

**1) Does the title adequately reflect the content of the manuscript?: Yes**

**Authors:** Ok. Please note that we made a minor correction following a comment from Reviewer A.

**2) Is the manuscript a relevant scientific contribution to ecology?: Yes**

**Authors:** Ok.

**3) Does the summary present the main idea of the manuscript and its objectives and main results and conclusions?: Yes**

**Authors:** Ok.

**4) Are the keywords pertinent and different from the words used in the manuscript title?: Yes**

**Authors:** Ok.

**5) Does the introduction present the theoretical/empirical content in which the manuscript topic is inserted?: Yes**

**Authors:** Ok.

**6) Are the methods adequate and clearly presented? : Yes**

**Authors:** Ok.

**7) Are the results, discussion and conclusion clearly presented and do they correctly address the objectives of the study?: Yes**

**Authors:** Ok.

**8) Are all the figures and tables essential and self-explanatory?: I suggest changes in figure 1 to include a map with the state of Rio de Janeiro and the location of the Serra da Bocaina National Park**

**Authors:** We add a map showing our study area in the Rio de Janeiro state as suggested.

**9) Are the references pertinent and up-to-date?: Yes**

**Authors:** Ok.

**10) Final Considerations:: I believe it to be an extremely important article for publication, due to the lack of data of this type for this species and the long duration required for population studies with mammals.**

**Authors:** We thank you for your comments**.**