# A review for:

**Spatiotemporal relationships of coyotes and free-ranging domestic cats as indicators of conflict in Culver City, California**

Note: This review is written in markdown format. I've also attached a pdf of the review if that is easier to read.

In this paper the authors examined the spatial variation in cat, cottontail, and coyote habitat use across Culver City, a city in southern California. I found the writing good, and the authors made a good case for the necessity of the research. Great job! From my reading of the manuscript, I've no big concerns with the study design or analysis. However, I would strongly caution the authors about the inference that is being made given the study design. I bring this up in length in the remaining review, but briefly, sites were selected such that coyote and cats were likely to occur there. This limits the inference that can be made, as these locations may not be representative of Culver City, on the whole. I do not think this invalidates the study at the least, but some care is necessary when considering the implications of the results in the discussion.

I'm waiving anonymity on this review, the authors are more than welcome to reach out to me if they need any clarifications about any questions or comments I have made below.


- Mason Fidino (mfidino@lpzoo.org)


## Introduction

---

### top-level thoughts

1. The writing here is great, and the flow of the introduction sets a clear path for the research. I've just got a few suggestions below that could improve certain parts that may require some additional explanation or clarification.

### line by line comments

Line 42-44: It is a little unclear what urbanization is having an affect on here. The first example pertains to the physical environment, while the remaining examples are likely associated to species in urban environments. Certainly, fragmentation can have positive and negative effects on wildlife, but it may help to make it more clear that all of these examples apply to species.

Line 49: This paragraph could be improved by adding a crystallizing point to the end of it (currenlty it ends on an example). Given the information you've provided a reader (through these great examples) what do you want them to take away? Does it make urban environments an exciting 'new' stage to answer questions about community dynamics? Or perhaps, as a result of these changing dynamics (which no doubt can vary within and among cities), much is still unknown about the extent to which species interact in urban environments? Given the end of paragraph 2 I'd suggest making the point about who much is still unknown about predator-prey interactions in urban areas. That way you can present the idea in paragraph 1 and nail down how coyote are an ideal species to better understand this question.

Line 50: Affected by what?

Line 71: are cats just in urban matrices? I'd think not, so maybe use something a little less specific. Likewise, you later lead into how we don't know about coyote cat interactions in urban green space (which isn't really the urban matrix) on line 91.

Line 91 - 92: Domestic cats and coyotes were part of our analysis of urban green species in Chicago (Gallo et al. 2017), so I'd change this sentence. Briefly, we found that cats were more likely to occupancy city parks whereas coyote where more likely to occur in other types of greenspace (e.g,. golf courses, cemeteries, and natural areas). This result actually seems quite different from your system given the large amount of spatial overlap among coyote and cat throughout Culver City, which is quite interesting!

```
Gallo, T., Fidino, M., Lehrer, E. W., & Magle, S. B. (2017). Mammal diversity and metacommunity dynamics in urban green spaces: implications for urban wildlife conservation. Ecological Applications, 27(8), 2330-2341.
```

Line 95: I wonder if you even need to introduce Culver City here? You could still be writing generally about coyotes & cats in southern California and bring up this Culver City information in the methods (which feels like the location in the paper that you can demonstrate how Culver city is an ideal place to study coyote & cat interactions). This would, of course, require some additional revision in the following paragraphs given that Culver City is brought up multiple times. Regardless of how the authors decide to tackle this, the sentence (as it is), is quite long and so some modification here would help.

Line 101-103: Coyote are often nocturnal in urban environments, I'd be specific about this (they are often crepuscular in more natural settings).

Line 103: Why do you predict cats will temporally overlap with coyote?

Line 106: Do cats really prey on cottontail rabbits? I think a lot of readers may wonder this. Or is this sentence trying to say that coyote may be selecting habitat based on other species (e.g,. rabbits)? I'm unsure.

Line 110-116: You are putting the cart before the horse by leading with this information in the last paragraph. It would be more clear to start with something like: "To better understand coyote and cat interactions in urban environments, we surveyed coyote and cats throughout Culver, City California using motion-triggered camera traps. Camera traps are... Using occupancy models (citation), we sought to determine..."

## Materials & Methods

---

### top-level thoughts

1. One assumption of standard occupancy models is that sampling locations are independent of one another. As such, if an individual is observed at site *A* it should not be available for sampling at site *B*. It is not the end of the world when this assumption is violated (which is often the case). It just means that the inference you make changes. Instead of making inference on occupancy, you are instead assessing relative patterns of habitat use. You are very close to making this point around lines 174-175, but it would perhaps help to define what you mean by occupancy for this study (perhaps in the statistical analysis section).

2. If camera trapping locations were informed by the presence of coyotes, then the estimated relationships should end up positively biased (because it is assessing occupancy in areas where coyote are reasonably expected to be). Likewise, camera trap sites were selected to be near where cat deaths were reported. Both of these no doubt modifies that type of inference that can be made, as the locations are not a random sample from Culver City, but rather at a subset of it where 1) coyote are expected to occur and 2) cat deaths have been observed. I think that the aim of the study provides reason for why this was necessary, but this limits the generality of the results (and as such should be acknowledged).

3. I'm confused about the 50m vs 150m buffer explanation. Is it that cameras were kept at a minimum of 50m apart? If so, that may be a more precise explanation for that.

4. What was the secondary sampling unit in the occupancy analysis? Cameras were active for 6 months, looking at `peerj-69611-InputFile_Coyotes.txt` there are 7 secondary sampling occasions. To add to the confusion figure 2 is apparently created with data across a 7 year period. I hope that this single-season occupancy model was not parameterized with data across a 7 year period (with each year as the secondary sampling unit).

5. The green space metric was z-transformed, could you provide the mean and sd of those data too? That would help with interpretation.

6. Eight models were fit to the data using all possible combinations. However, I'm uncertain which covariates were included on occupancy and which were included on detection. I can see this in the R scripts provided, but it may help to say something to the effect of "Given 2 possible occupancy covariates (x and y) and 1 possible detection covariate (z), there are 8 model combinations, including the null model." around lines 246.

### line by line comments

Line 149: *Camera Trap Analyses* feels like the wrong header for this section (given that there is a *Statistical Analyses* header as well). Perhaps *Sampling* or *Camera Trap Study Design*?

Line 168: What size buffer zone?

Line 169: Often this type of sub-sampling is not necessary, see Zuckerberg et al (2012, 2020). However, your buffers here are quite small, and so the locations are still almost on top of one another, so perhaps sub-sampling is a good idea?

Zuckerberg, B., Desrochers, A., Hochachka, W. M., Fink, D., Koenig, W. D., & Dickinson, J. L. (2012). Overlapping landscapes: A persistent, but misdirected concern when collecting and analyzing ecological data. The Journal of Wildlife Management, 76(5), 1072–1080. https://doi.org/10.1002/jwmg.326

Zuckerberg, B., Cohen, J. M., Nunes, L. A., Bernath-Plaisted, J., Clare, J. D., Gilbert, N. A., Kozidis, S. S., Maresh Nelson, S. B., Shipley, A. A., Thompson, K. L., & Desrochers, A. (2020). A review of overlapping landscapes: Pseudoreplication or a red herring in landscape ecology? Current Landscape Ecology Reports, 5, 140–148. https://doi.org/10.1007/s40823-020-00059-4

Line 203: See the Zuckerberg citations above about how overlapping buffers don't especially matter.

## Results

---

### top-level thoughts

1. When including your beta coefficients in the text of the results, you may as well also add the 95% CI's too (\beta = 2.18, 95% CI = lo#, hi#). This could completely remove tables 2 and 3, which are not especially needed. This should be done with regression coefficients and occupancy estimates throughout the entire results section.
2. There is no reference to the model intercepts here, which are actually quite helpful given the mean-centering of the covariates. Given the low number of covariates in general, it may make sense to do something like:
    - say what the average occupancy of species x is (which is just the intercept value back-transformed to the probability scale via the inverse logit link).
    - Following that, you can say that occupancy increased or decreased with increasing covariate y.

    This lets you get all your information out to the reader. How common is the species. How does their distribution change. In fact, you do this for cottontail rabbit, which is great!

### line by line comments

Line 270: The highest ranked coyote occupancy models... There were multiple model fit to different species, so leaving coyote to the end of the sentence makes this awkward.

Line 278-280: Are you comparing variable importance between the occupancy and detection models? That's not really something that is done (they are separate processes). Likewise, if I recall, the standard turn of phrase is variable importance weight, not variable important value.

## Discussion

---

### top-level thoughts

1. The aims and study design do not line up as well with the discussion of the results. As I brought up in the methods section, camera traps were located in areas were coyote and cats are expected to occur. Yet, the discussion is more focused on the interactions among coyote and cats, on the whole, throughout Culver City. I think the points being made here are valid, but some caution is warranted here. Likewise, this may be something you could perhaps lean in to and capitalize on. It seems like the city has a good idea of where coyote are, and where cat deaths occur. How do the insights you learned here help us better understand these areas throughout the city?

Essentially, the study design made it so you were less likely to have areas where 1) coyote are but cats are not and 2) cats are but coyote are not. You tried to ensure both were going to be present, and so your inference should be conditional on this.

2. Perhaps one thing you should try to get ahead of, and maybe this is better placed in the methods, is that there are a multitude of occupancy models for multiple species (e.g., a dominant predator and subordinate prey species). Your sample size no doubt would not allow for fitting such models, and so you opted to use a metric of relative activity instead. One occupancy model that estimates co-occurrence that comes to mind is Waddle et al. (2010), but there are countless others. I leave it to the authors to decide whether or not they feel it is a good idea to try and get ahead of this, as other readers who are familiar with occupancy modeling may wonder this.

Waddle, J. H., Dorazio, R. M., Walls, S. C., Rice, K. G., Beauchamp, J., Schuman, M. J., & Mazzotti, F. J. (2010). A new parameterization for estimating co-occurrence of interacting species. Ecological Applications, 20(5), 1467-1475.

### line by line comments

Line 316-318: Certainly, every discussion needs a caveat section, but don't put it at the end of the first paragraph! This is where your discussion of the main takeaways from your study should go. Leave the caveats for later in the discussion.

Line 348: There is a big difference between statistical significance and biological significance. Given the overlap figure the authors provided, it still appears that there is substantial temporal overlap among these species. Certainly, the peaks of activity may vary among species, but there is still about 0.70 overlap.

Line 372-382: I wonder how clustered in time the cat events were. Given the relatively long sampling window (6 months) it is possible that cat activity was not 'constant' at the site, and they simply had a lot of activity on just a smaller number of days.

Line 383: Again, this is conditional on your study design.

Line 411: Here too. The study design was focused on areas where the species were likely to overlap, as such it is difficult to make such a statement. Certainly, when they do overlap this sounds plausible, but the extent to which they overlap would require a different study design.

## Figures

---

Figure 2. If the data come from December 2019 to June 2020, why is this figure a heatmap over a 7 year period?