GULN notes on moving forward with Bird Analysis

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Hi Ellen,
Thanks for sending the analysis summary word document yesterday and for updating us on your progress during the meeting. It's no small task we've put you to, and even though the analyses aren't there yet, we've definitely come a long way towards understanding the challenges -- and I'm especially glad you've been able to connect with JP and Matt to get their insights.

This morning, we were able to discuss as a group some of the decisions that came up during yesterday's meeting. First, I'll give the major upshots of our discussion, then I'll respond to some of your questions, and lastly, I'll let you know how we'd like the results reported, once you get all of the possible covariates together. I'm responding based on our GULN discussion plus a little research I did after we talked this morning. If others in GULN want to chime in about things that I may not have captured well in these notes, please do so.

Upshots:

The main upshot is that the network will not be asking cooperators to change their approaches this summer, and we will continue to collect all of the data in the same way. Given the complexity with finding the right modelling approach, we don't think there's enough evidence in favor of changing anything without additional expert input, and we will encourage regional leaders to move forward, as much as possible, towards a centralized bird trend analysis agenda item.

The other upshot is that we would like to finalize this project for you, Ellen, so that you can move on to other projects and we can move on with reporting. To do so, I think we just need to tie up the loose ends with forest cover covariates and then having you summarize what you've learned so far. Hopefully, that summary will be enough information to decide how we will calculate our abundance or relative abundance estimates, so we can write up that first round of reports for each park (this will not include analysis of trends, just abundance or relative abundance for the park's top birds for each year or combined across years). If need be, we won't have a problem with reporting the raw data as individuals per point count location, without a detectability offset, but it would best to review your model results before making that decision.

Here are the responses to your questions:

Q1, distance bands: How feasible does it seem to create an outermost distance band of 100-150 and 150+? Currently, bands are 0-25, 25-0, 50-100 and 100+, and adding a farthest-out band would be useful especially when 0-25 and 25-50 need to be lumped, due lack of detections in 0-25.

Q1 GULN Response: During our group discussion this morning, we thought it would be a fair assumption that the final bin could be capped at 150 m. We thought this because it seemed unlikely that most birds would be heard at a distance greater than 150 m (for our staff, you can visualize 150 m as the distance from the loading dock to the farthest back point on the driveway in the fenced in area). We even proposed testing it a bit ourselves, but after our meeting, I figured someone must have done this already, and a quick search revealed a study that did. This is the link to the paper, and Appendix 1 has

the estimates for various bird species. I was surprised to see that for the bird they tested, humans could hear their songs up to 350 m away in forest on average, and up to 680 m on average, along roadsides. At the end of this message, I pasted a summary from their Appendix 1 of the effective detection radius (EDR) for the birds they used, but you'll have to interpret those pesky 4-letter bird codes on your own.

If these EDRs are representative of our area (these data were collected in Canada, but they did look at the effects of humidity and stuff like that), it makes me think we can't reasonably cap at 150 m for any bird species. As far as making modifications to sampling methods going forward, we don't want to add to the fieldwork responsibilities for our cooperators and ask them to add a new estimation band of 100 to 150, followed 150+ m. We also have a hard time believing most humans could accurately delimit a 100-150 from a 150 plus bin, at such a far distance away. Unless we can find other evidence to the contrary, I think this leaves us with capping the maximum bin at 100 and exclude observations at 100+ for distance models except SOLYMOS. Please let us know roughly what proportion of birds you're finding that need the 0-25 and 25-50 lumped and therefore would need to be left out of the DISTANCE model approach because of only 2 distance bands. Depending on the number of birds this excludes, this could very well lead us to favoring N-mixture models over distance models.

Q2 decibel meter: Is it feasible to use a decibel meter in the field?

Q2 GULN Response: As mentioned in the previous response, we do not currently want to add to the field workload of our cooperators. We were curious as to whether the categorical noise variable was a useful covariate in many of the models that you have run already? The decibel meter seems like a good non-subjective measure of noise, and we'll keep it in mind even if we aren't going to implement it this year.

Q3 forest cover: Can we get anything from NLCD data or another source?

Q3 GULN Response: It sounds like you are giving that a try with the R script you found. If it worked for Matt, maybe it would help us too! I asked Jeff what he thought of the NLCD data, and he thought it would be a bit coarse and may not improve much on current veg classifications you are already using. As an alternative or in addition, he said he would go ahead and calculate a few metrics at the plot level from LiDAR: vegetation density and canopy height are likely choices. To do so, however, we need to decide on a sample area size. Is a 100 m radius what you used before? Or should it be bigger like 500 m as Matt was using? Once Jeff is given a value for sampling area radius around each point, he thinks he could have the data for all the points in less than a week's time at work.

How GULN would like the results

Once you get this final batch of forest cover-type covariates (from Jeff and/ or you extract NLCD data using an R script), we would like to see the results for only a subset of the models you mention, as applied to your selected subset of birds and parks.

Since you've found that time to removal models aren't working for these data (and probably won't until we get a lot more data), we can rule out models that include a time-to-removal component. I think this means leaving out SOLYMOS or at least the full version of that. There are still plenty of options, and we really only feel prepared to compare 3 or 4 models. I'll suggest our top preferred models to compare, but if you think a different subset would be better, that's fine too. As far as which covariates get used and/or which distribution (neg bionomial or poisson), I think we just want to see the top version or 2 of each model, because we will be overwhelmed if there's much more. We trust that you are ruling out things that really aren't serving our needs, so we can more quickly arrive to a decision.

We would like to see abundance/relative abundance estimates (as plots or tables) for
STAN_PCOUNT
DISTANCE (for the subset of birds this works for)
GDISTANCE

I understand the BRMS_GLMM is good for comparing trends over time, but will it also give us some kind of credible intervals for individual year estimates? IF so, it would be good to have that to compare with the other detectability-offset models.

Also we'd like a summary of how well those different models seem to be performing, which ones require that we exclude certain birds (those with too-few detections in 0-25), and a brief explanation of why the removal models are not being used (your notes seemed like they covered this pretty well, so just another version of that).

Thanks for doing all of this Ellen; -- and let me know if you want a call with a subset of us to go over this in more detail,

Jane

Summary table modified from Appendix 1 of
Yip, D. A., L. Leston, E. M. Bayne, P. Sólymos, and A. Grover. 2017. Experimentally derived detection distances from audio recordings and human observers enable integrated analysis of point count data. *Avian Conservation and Ecology* 12(1):11.
https://doi.org/10.5751/ACE-00997-120111

bird	EDR, m, in Conifer	EDR, m, in Deciduous	EDR, m, along Road
BADO	550	658	842
BAWW	238	213	515
BEKI	294	224	619
BHCO	341	318	811
BLWA	220	197	517
BOOW	593	665	
CATO	369	453	527
CCSP	323	221	717
CMWA	204	183	
CORA	339	402	617
DEJU	338	272	857
GGOW	451	552	754
LEOW	439	604	761
LISP	340	315	883
NSWO	514	654	
OSFL	360	385	672
OVEN	325	268	810
PISI	309	251	690
RBGR	352	460	724
RBNU	384	457	686

TEWA	242	200	625
WAVI	325	283	787
WETO	340	386	449
WTSP	398	427	721
YERA	212	188	442

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