Caw Cawlling All Experts: Do Expert Birdwatchers Underreport Common Birds?

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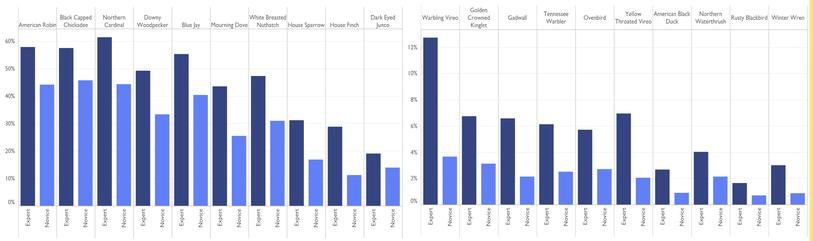
Introducktion

eBird.org is a citizen science project with more than 100 million bird sightings contributed each year by eBirders. Sightings are self-reported and are used to do real science, so it is crucial to ensure that observations are valid. In 2015, Kelling et al. designed a model to compute "expert" scores for eBirders so that "expert" sightings could be weighted more highly during analysis.

Hypothesis. We hypothesize that "experts" in this system will report common birds less often than "novices" because their ability to sight uncommon birds diminishes any desire to report common birds. If this is the case, then putting more weight on "expert" sightings would misrepresent bird populations.

Owl About Our Data

The data from eBird.org contains everything from the eBirder's location to which species were observed to the time spent birdwatching. For the purposes of our project, we used observations from 2019 from a region in the Midwest. Keeping with Kelling et al., "common birds" are the 20 species most reported; "uncommon birds" are the 20 least. "Experts" are all birders with an expert score in the top quartile; "novices" are those in the bottom (more on the expert score below).



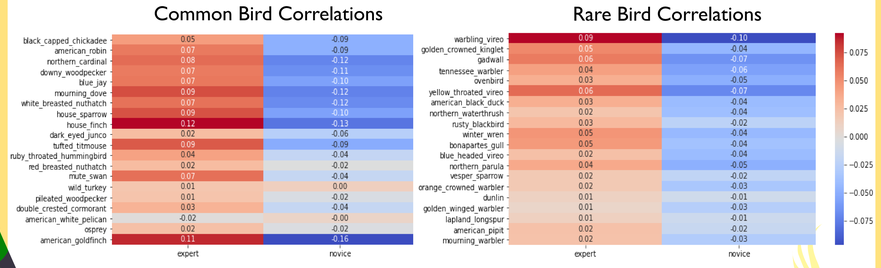
Kelling et al. calculate an "expert score", a model which uses a Poisson generalized additive mixture model to predict the log-expected-value of the number of species observed while controlling for hours spent birding, distance travelled, NASA land data, day, time of day, fixed effects across observer IDs, and a few other non-linear terms. Because the NASA data was unavailable to us, we could only keep observations that matched one of their observations within a latitude and longitude of ±0.001. This filtering did not meaningfully alter the distribution of the data, though it decreased the quantity by 20%.

Dovelopment #1

We first focused on the actual quantity of common birds reported by experts to see if they report fewer species in a list. To test this, we ran a single regression to predict the. number of common birds reported from expert scores.

Variable	Coefficient	t	p-value
Constant	-0.5090	-5.758	0.000
Expert Score	1.8552	64.612	0.000

Results. We found that increasing a birdwatcher's expert score had a significant positive effect on the number of common birds reported. Specifically, expert birders reported seeing a higher number of common bird species in each observation period than novices. Higher expert ratings led to more reported species of every kind, both common and uncommon, on average. The results go against our hypothesis and indicate that our intuition might be incorrect.



Dovelopment #2

Next, we focused on the proportion of common birds to the total number of birds reported, rather than just the counts of the species, because experts reported all birds more, potentially skewing the results above. We ran a single regression to predict the proportion of reported sightings that were common birds from expert scores.

Variable	Coefficient	t	p-value
Constant	0.3191	54.310	0.000
Expert Score	3.572e-05	0.019	0.985

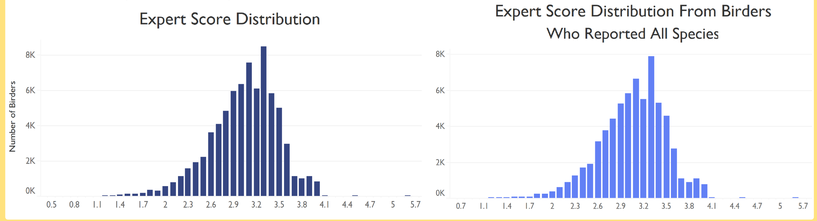
Results. We found that increasing a birdwatcher's expert score had an insignificant positive effect on the proportion of reported sightings that were common birds with respect to uncommon birds. This also refutes the hypothesis as it indicates equivalency for the two groups.

Dovelopment #3

Finally, we focused on filtering the dataset to include only birders that indicated they had reported all sighted bird species on their checklist for the day, investigating the idea that expert birders who saw all of the birds would then underreport the proportion of common birds and instead focus on the other, more rare birds. To test, we ran a single regression to predict the proportion of common birds based on expert scores, filtering on "all reported".

Variable	Coefficient	t	p-value
Constant	0.3908	64.463	0.000
Expert Score	-0.0199	-10.031	0.000

Results. While experts are more likely to underreport common birds, with this control, the impact is very small. Although this evidence supports our hypothesis, further research is needed to recalculate expert scores using a model that ignores rows in which all species have been sighted (a possible confounding variable) to verify these results.



Let's Hawk About It

The logic used in our hypothesis was incorrect (so **hawk**ward). Expert birders report common birds more often than novices. Perhaps their overall higher skill aids them in spotting common birds, some of which are small or elusive. As such, when using the eBird data, giving experts more weight due to increased credibility will not misrepresent common species populations.

Future research. Future studies will hopefully experiment with new definitions of expert scores. Additionally, we would be interested in similar studies done on other regions and over multiple years. Finally, a study incorporating other datasets, such as surrounding human population, rural/urban distinctions, and greater wildlife information, would provide even more context for bird sightings around the world.