**Ontario Breeding Bird Atlas Analysis**

**12 November 2024**

1. Review atlas analysis objectives / current data / model structure / examples of outputs (15 min)

**Objectives:** Estimate habitat associations and spatial patterns in species occurrence, relative abundance, and population change between atlases

**Current data:** NatureCounts (OBBA-2 and OBBA-3), Wildtrax (OBBA-3)

**Model structure / logic:**

* Bayesian analysis allows for informative priors on covariate effects and range limits (from eBird), and integrated analysis (point counts + checklists)
* Square-level random effects
* Spatial autocorrelation (range/sd estimated by model)
* Habitat / climate covariates
  + Extracted within 1 km of point counts
  + Currently collapsing them into principal components but can approach this in multiple ways
  + Included as quadratic effects to allow for intermediate optimum
* Analyzing multiple atlases simultaneously (OBBA-2 and 3), which improves precision of estimates
* Poisson or negative binomial error
* Separate intercept for each atlas
* Detectability offsets estimated using QPAD approach (Solymos et al.), extracted from the NAPOPs package (Edwards et al.)

**Examples of results:** Dave to share figures

1. Identify covariate layers to consider in analysis, based on the large amount of work already done by folks in this email group (30 min)

* Need covariates that are relevant for each atlas period / describe change between atlases
  + Currently only have time-invariant covariates
  + E.g., How has landcover changed? Disturbance? Urban footprint? Climate?

1. Delegate next steps (10 min)
   1. Data QA/QC (probably best done by Ontario CWS and Birds Canada)?
   2. Continue improving the model structure / workflow (David Iles, Dean Evans, Sarah Endicott, Josie Hughes, others?)
   3. Obtain relevant covariate layers (BAM team, Ontario CWS, NRCan, etc)
   4. Identify the best way(s) to evaluate model quality (note that this is already a key goal of the Northern Ontario Bird Modeling Working Group led by Russ Weeber and Josie Hughes)
2. Set up next meeting date (5 min)

**Questions from Mike Cadman – to be discussed during the meeting**

*Integrated analysis of checklists and point counts*

Can checklists be analyzed to map relative abundance? What is eBird doing on this?

Is the current approach to including checklists the best we can do?

*Habitat covariates*

How well do point counts represent the habitat in the square (or ecoregion)? How can we improve on that in 2025?

If point counts are biased by habitat, can we compensate for that in analysis by weighting habitats?

Can we include forest (or grassland?) interior as a habitat variable? % forest cover? Riparian areas? Other habitats not normally addressed by land-cover mapping?

How to best assess habitat change between atlases?

*Goodness-of-fit*

How many species get adequate maps using the current analysis approach? Is that enough? Can we tweak the approach to improve the number of good relative abundance maps we can produce?

*Sampling improvements*

What analyses could we do that would help us tweak point count approach (sampling or count methodology) in 2025? Or what have we learned so far regarding whether we should tweak the approach - or emphasize certain kinds of counts?

Have we determined whether Zoom, ARU, and in-person point counts provide equivalent data? If they don’t, can we compensate for differences, or how do we best use them together? How about the various types of point count: unlimited distance vs 2-distance categories vs 3-distance categories.