

## Bridging the Gap between Models and Recorders

*Workshop session at the BRC Recorders' day, 23 March 2019*

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### Summary

We have made huge progress in understanding the biases in biological records and have greatly expanded their use for a range of applications such as indicators and Red List assessments. To date we have mostly adopted a one-size-fits all approach, but we would like to improve our models by better capturing differences in biology and recording behaviour among taxonomic groups.

The workshop discussed how to best capture information about species and how they are recorded to inform our future analysis developments. Group discussion focused on two specific questions: 1) What other biases or issues might impact on our models? 2) What might recorders be willing to do (to increase model reliability)?

General outcome supported the view that one-size does not fit all. Biological records data are extremely heterogeneous, and many additional biases likely exist (beyond those that have been modelled). Many of the issues are specific to particular organisms, but there is a broad axis of variation associated with the amount of skill and effort required to record a particular group. For speciose groups that are hard to identify (e.g. many flies), most recorders are dedicated experts and the biases are therefore quite different from groups such as dragonflies, which are more species-poor and easier to identify, thus creating a large set of records from participant with a wider range of expertise. The occupancy-detection model is really designed for this second group of taxa, where it is reasonable to assume that data collection methods are broadly consistent. Collection methods and recording behaviours are likely to be more heterogeneous for speciose groups and/or those where a high level of specialist skills are required, thus stretching the assumptions of the model.

Recording schemes are generally open to the notion of collecting additional information (e.g. on effort), so long as it is clearly communicated. However, capturing this information in a systematic way may be challenging due to inter-scheme variation in recording. For example there is not much enthusiasm for scheme-specific data entry forms within iRecord, although perhaps this reflects the fact that few schemes use it as their primary mode of data collection.

To address these issues, BRC will work with schemes to produce a table scoring species against a small number of criteria about how they are identified (e.g. extending the current NBN Record Cleaner rulesets for species identification). This would enable the occupancy model to moderate the data to reflect the fact that certain types of survey do not record all species. Criteria might include "identification accessible to novice recorder", "requires microscopy", "detectability has changed dramatically over time" (e.g. due to a widely used new field guide).

### Detail

Format: A ten-minute presentation followed by 30 minute discussion in small groups (~10 people). The discussion did not attempt to identify which biases are most prevalent and identify actions. Rather, the aim was to initiate a conversation with schemes to be explored in more detail at a later date.

### *Biases/Behaviours*

- Skill of the recorder
- Year lists (i.e. amalgams of records from multiple visits) may be common among some taxa

- Literature used for identification
- Use of microscope
- Whether a specimen was taken
- Vegetative or flowering
- Efficiency/effort, although this is related to people's skill/experience in 'reading the landscape'
- Whether people record using a restricted list (e.g. plants but never grasses)
- Pulses of effort (e.g. in response to media coverage, specific projects or new staff)

#### *Likelihood of being recorded*

- The 'prior knowledge' bias, believed to be an issue for plant recording, is likely to be true of any long-lived sessile organism (or group), e.g. benthic marine organisms, hibernacula for bats and amphibians.
- Some species cannot be identified at the species level unless taken into a lab and dissected or looked at under a microscope. Is it still worth recording at the genus or family level?
- Identification bias interacts with recorder skill and motivation. For example, only a subset of recorders is willing to use a microscope.
- A possible solution would be to create a spreadsheet of species by identification method (e.g. needs microscope, easy, detection has increased due to a field guide).

#### *Method of sampling*

For invertebrates this is really important – different flies can be sampled in very different ways – some will appear in sweep netting, others malaise traps, other pan traps etc. [discussion with Martin Drake] We wouldn't need to know the efficiency of these methods in advance – they could be included in covariates and the impact on recording tested. This would itself be valuable information for the recorders. Even for moth trapping, there is heterogeneity associated with different bulb types.

#### *Communication*

People are often prepared to do some standardisation if they are told how to and why. Communication plans are really important. Some delegates said they would be prepared to ask more from their recorders but it's important to give the recorders more feedback if we want more information from them.

#### *Access to the countryside is regionally important*

- e.g. in NI there are no footpaths and no right to access – people restrict themselves to the 'safe spaces' that are known to be ok for access
- densities of footpaths, open access land etc elsewhere
- setting up survey squares on behalf of people increases participation [more about structured schemes?]

#### *Spatial resolution of recording*

- Important for linear sites such as coastal – people will often record the first instance of something, even if the walk covers several km of coast
- Recorders are willing to be nudged to record 'per site'. At a local level this is about recording within fields, rather than across a whole reserve
- Site names are really valuable. It really helps in assessing habitat associations, even if the site goes over several grid squares.
- iRecord is great for pin-pointing records, but how do you deal with really common species, for which pin-pointing is not useful?

### *Quantity vs Quality*

iRecord provides a league table of number of records, but there is a difference between loads of records of common species from a garden. Could have quality of records in a league table? But this risks playing the system and over-egging confidence (i.e. claiming new species when they are debatable).

### *Effort recording*

- How does this work for groups? 2 people are (sometimes) better than 1, but a large social group could be worse than 1!
- The style of Recording cards is great for quickly ticking off species: eBird (<https://ebird.org/home>) uses this approach very well.
- Time and distance is a good combination as a proxy for effort. [eBird app now records this – you press start and stop on the app.]
- With an app we could even have recording by voice – would be great to have automated digitisation of records with location.
- Time of day should be reported, and start time and end time would be even better so we could obtain a measure of effort

### *'Known' people*

Those who are known can be trusted, but we need a way of tying iRecord users to imported data – currently this isn't possible.

### *Nudging*

Could try to incentivise people who only record in few locations to 'go next door' to record, or to incentivize visiting a particular space

Push notifications could be useful.

### *Weather*

This was felt to be very important for some groups, but not obvious how to record it, e.g. the weather now or yesterday or a month ago? One group was more concerned about the weather conditions at the time of recording, although much of this kind of variation is noise, some of which could be modelled using available data (e.g. daily temperature). However, subtle non-biological relationships with weather may be at play: one group was concerned with weather conditions in the past (for example floods) and the impact they can have on the probability that a survey will be carried out and of detecting anything if the site is surveyed.

### *Occupancy model*

There is an argument for list length thresholds (1, 2, 4) may need to be taxon specific.