How much is enough?
Optimising biodiversity surveys

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Tweetable abstract:

#LincolnPGR17

Simple & effective method to ensure optimum resource allocation for #biodiversity #surveying

Background

Biodiversity loss is at an all time high[1] and many governments have pledged to halt the decline, making long term biodiversity monitoring critically important.

Resources for monitoring are limited and so Must be used wisely.

Carnivorous sundew (*Drosera rotundiflora*)

Problems

Although many long term surveys use modern statistical methods to determine initial sample sizes[2], many of these techniques are complex and resource intensive. Consequently they may not to be repeated between iterations[3].

This can lead to situations where surveys oversample.

Oversampling is wasteful and consumes resources which might be redirected to other areas of biodiversity monitoring.

Solution

Using a long term national survey as our model system (www.Countrysidesurvey.org.uk[4] (CS)) we have developed a technique which allows us to use historic data from the survey to inform future sample size.

Bog Bean (*Menyanthes trifoliata*)

Methods and Results

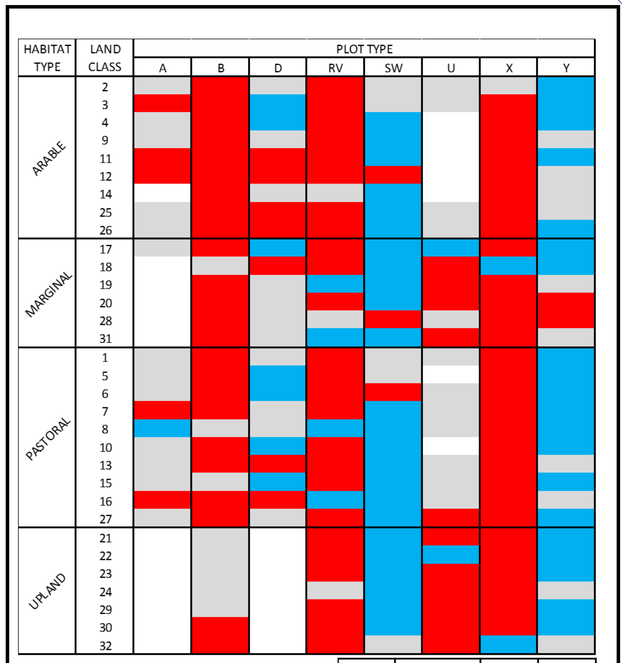
CS makes a good model system as it has several different plot Types (labelled A to Y in figure 1) which vary in size, shape and number and these are distributed through a large number of sampling squares.

Working on one plot type at a time we modelled the effects on species richness of sequentially reducing the survey size by randomly removing plots from each square. We then boot strapped this to ensure statistical rigour. We used cut off points of 2% for accuracy and 10% for precision to determine how may plots could be dropped.

The results are fairly consistent across landscape types but vary more between plot types. The large (200 m²) X plots which are the backbone of the survey could have been reduced by up to 50% in almost all cases and in most cases the riparian SW plots could have been reduced by over 50%.

<-Typical pastoral landscape

Typical arable landscape ->



		Number	%
	No data	27	10.5
	No reduction	63	24.6
	Up to 50%	106	41.4
	50% and over	60	23.4
		256	

Figure 1. CS (2007) plot types by land class and habitat type showing the degree by which they could have been reduced without affecting the surveys ability to detect changes in biodiversity (species richness).
Note that in almost all cases the large X plots could be reduced by up to 50%.

Conclusions

Use of our system allows for more optimal resource allocation so that extra resources can be diverted to other surveys whilst still effectively monitoring biodiversity change. This system is not species or habitat specific so it can be adapted for use on all survey types and is even suitable to highlight areas of commonality between surveys.

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