BUTTERFLY CONSERVATION UPPER THAMES BRANCH

Small Blue Report 2020

Andy Spragg

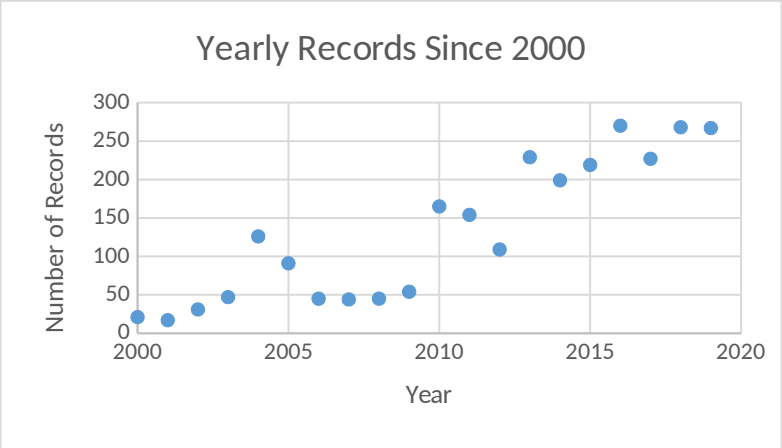
Photo © Andy Spragg, Radnage churchyard, 19 May 2020

2020 has been my first year in post as Small Blue champion. I “heeded the call”, prompted by several sightings in SU79 (my 10k champion square), and inability to share my excitement with the species champ because the post was vacant. The picture above shows the specimen responsible, which came as a complete surprise to me.

Because of the circumstances in which I took on the rôle, I have no accumulated specialist knowledge to contribute, nor a network of accomplices to leverage. What I *do* have is strong analytical capability, which I have used to develop a prototype species champ tool, using the official data set provided by Peter Ogden early in 2020. That data set spans a period of 20 years, beginning in 2000. My inaugural report will thus be in the form of a 20 year review, contrasting 2010-2019 (termed “current”) with 2000-2009 (termed “reference”), using my prototype species champ tool.

Recording effort

The dataset contains a total of 2,707 records, an average of 68 per year. However, there has been a steady increase in records over the entire 20 year period, which shows no sign of slowing down.

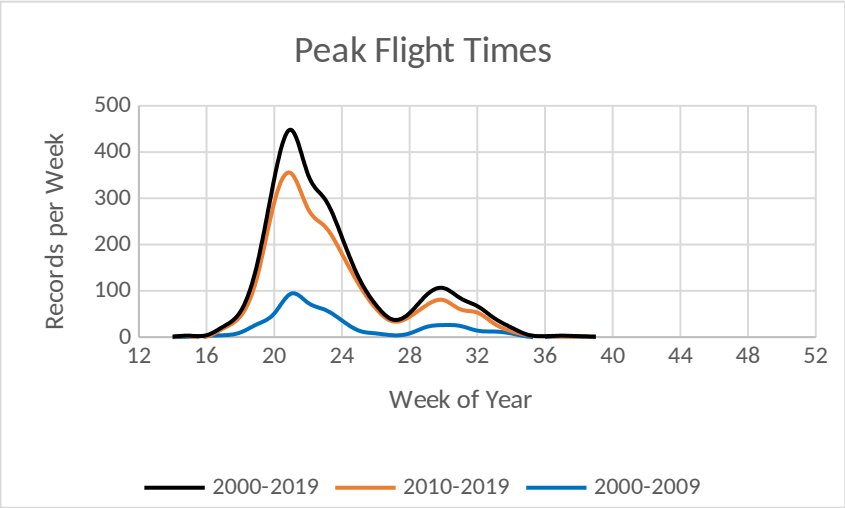


On average, the number of records per year has increased by 14 every year since 2000, starting around 20 per year in 2000 and currently around 270 per year. 2004 and 2005 must have been especially good years, with two to three times the typical number of records at that time.

The great majority of the records report sightings of the adult insect. There are just 79 records of other lifecycle stages, mostly eggs, and just 9 records of mating pairs.

Approximately one-sixth of the records came from a UKBMS import, and so do not specify a named recorder. From the remainder, approximately 300 individuals or pairs can be identified as having contributed to the data set. Two individuals have contributed more than 100 records each: Karen Saxl (292) and Jim Asher (154). Another seven individuals have contributed more than 50 records each: Sue Taylor, John Lerpiniere, Helen Hyre, Brenda Mobbs, Paul Huckle, Peter Ogden, and Ched George (whose name appears in the data set in 10 different variations; next nearest challenger has just six!)

On the wing



Over the entire 20 year period, there are two clear peaks in numbers reported, in the weeks ending May 26 and July 28. Comparing the current data with the reference data, there is no indication that either of these peaks have shifted in response to climate change, indications from other species notwithstanding.

At the extremes of the flight time distribution, the Small Blue has been reported as early as the first week of April and as late as the first week of October. These cannot all be dismissed as misidentifications; the 2011 species champ report speculates about the possibility of an undocumented third brood, and the 2014 species champ report noted a sighting on September 2, making 2014 the third year out of four with September sightings. The trend for late (post-August) sightings is clear: the reference period of 2000-2009 has only two years with late records, whereas the current period of 2010-2019 only has two years *without* late records.

Occupancy

Most of my effort has gone into a detailed analysis of the data in space and time, to attempt to provide a comprehensive answer to whether the fortunes of the Small Blue have been improving or declining over the last 20 years.

At the simplest level, I used a three-way classification for squares with records:

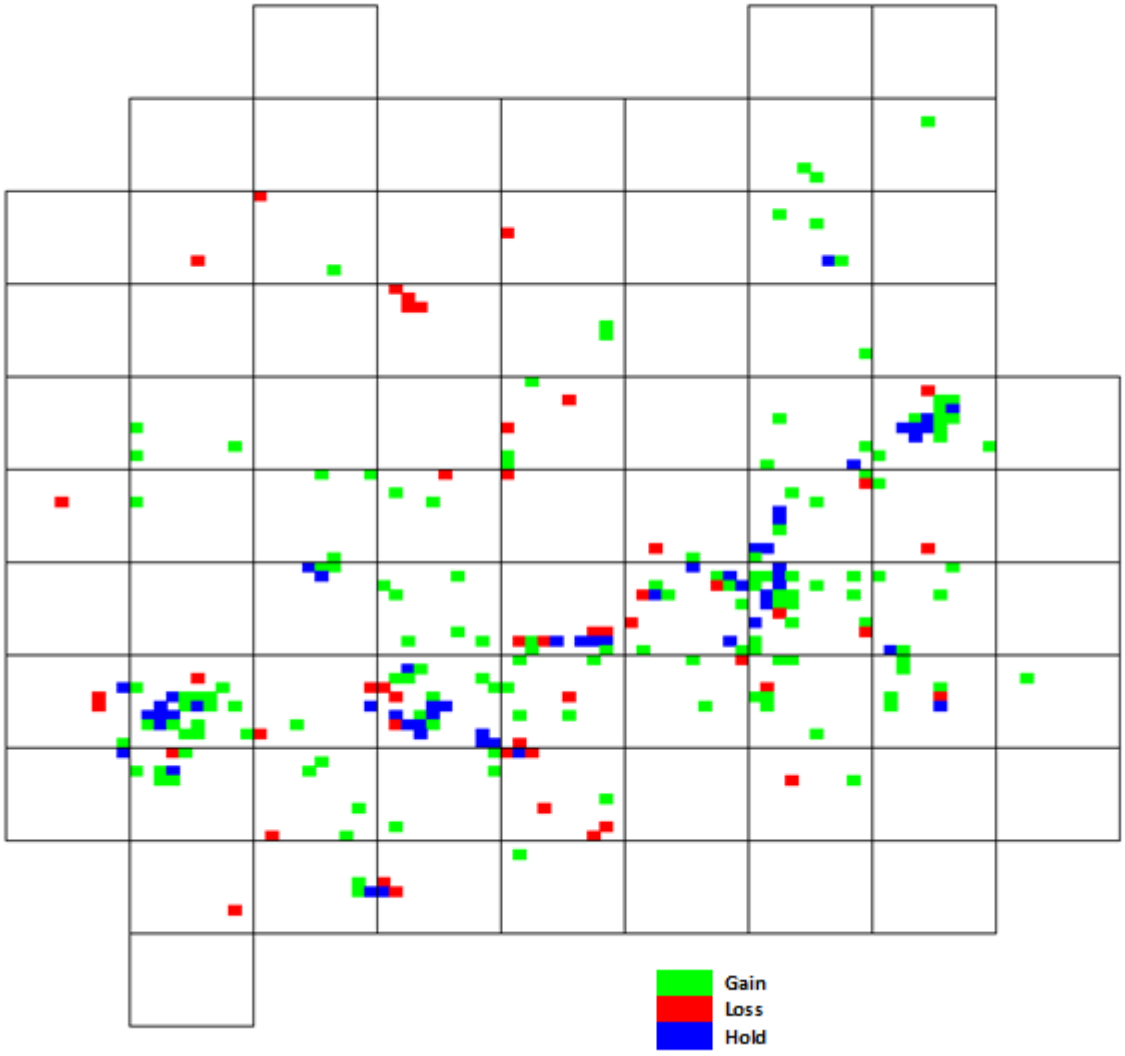
- “Gain”: a square with current records and no reference records
- “Hold”: a square with current records and reference records
- “Loss”: a square with no current records but reference records

The data suggest that the Small Blue has been doing very well. Although just 244 of the c.7900 1km squares in UTB territory have records, those 244 1km squares are made up of 139 gains, 49 losses and 56 holds. Although there are 49 1km squares where the Small Blue is currently not recorded where it was recorded previously, there are 139 1km squares where it *is* currently recorded where it was *not* previously i.e. a net gain of 90 1km squares (139–49).

Because of the steady rise in recording effort, we cannot simply say that all these gains represent true territorial expansion, and I have not (yet) attempted to disentangle the two effects.

The data are plotted at a 1km scale, with 10km square boundaries outlined. Gains are coloured green, losses red, and holds blue. The holds are very largely concentrated around a curved line running from south-west to north-east (presumably the geological backbone of the Chiltern hills). Curiously, each quadrant of UTB territory includes one established location (either one hold, or two adjacent holds) not on this line. The patterns of change away from the line of established territory are interesting. The Small Blue is clearly faring better in the eastern half of UTB territory than in the western half:

- In the east, gains clearly outnumber losses (and there are no losses at all in the north-east quadrant)
- In the west, the story is one of considerable flux; many squares have been gained, and many have been lost. In the north-western quadrant, there is a clear tendency for the gains to be located closer to established territory than before.



From the point of view of change over time, things get potentially a lot more interesting when we consider each square in the context of its eight neighbouring squares, not simply in isolation. Away from the line of established territory along the Chilterns, although the majority of the squares with records are spatially isolated, some are more interesting. In particular, all four off-line “holds” show interesting features. The two above the line both show expansion of established territory (green squares adjacent to blue squares). Below the line, the south-west location shows a western shift, with two losses to the east having been replaced by two gains to the west. The south-east location shows territorial separation, with a loss located directly between a hold and a gain. Along the established line, several other expansions of established territory can clearly be seen.

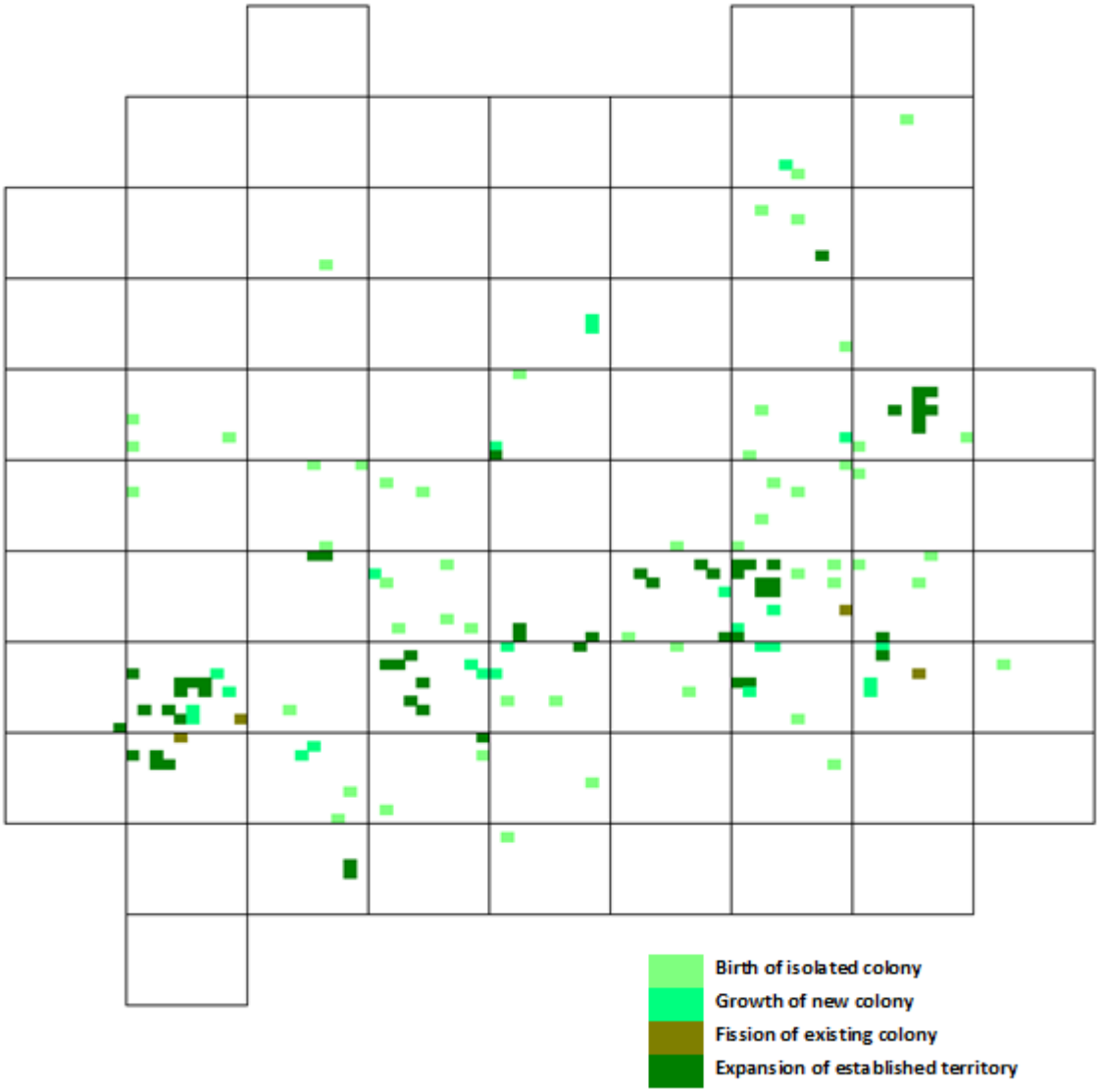
Taking this line of thinking to its logical conclusion, there are four possible neighbouring record scenarios for each square, independent of whether it is a gain, a loss or a hold:

- No current or reference neighbouring records
- No current but reference neighbouring records
- Current but no reference neighbouring records
- Current and reference neighbouring records

There are thus four distinct ways in which a gain can be a gain, a loss can be a loss, and a hold can be a hold. I have created a prototype description (a provisional verbal interpretation of the underlying numbers) for each of them. The table below breaks out gains, losses and holds into their respective sub-categories, and provides prototype descriptions and associated numbers:

	Number of neighbouring records		
	Current	**Reference**	**Count**
Gain			**139**
Birth of isolated occupied 1km square	*0*	*0*	*53*
Growth of new territory	*At least 1*	*0*	*25*
Fission of existing territory	*0*	*At least 1*	*4*
Expansion of established territory	*At least 1*	*At least 1*	*57*
Loss			**49**
Death of isolated occupied 1km square	*0*	*0*	*19*
Merge with existing territory	*At least 1*	*0*	*6*
Erosion to isolated occupied 1km square	*0*	*At least 1*	*9*
Erosion of existing territory	*At least 1*	*At least 1*	*15*
Hold			**56**
Maintenance of isolated occupied 1km square	*0*	*0*	*5*
Growth of isolated occupied 1km square	*At least 1*	*0*	*14*
Isolation of established territory	*0*	*At least 1*	*3*
Hold of established territory	*At least 1*	*At least 1*	*34*

The map below illustrates the “gains”, using four different shades of green, darker versus lighter to contrast more or less established territory:



Birth of isolated colony

Growth of new colony

Fission of existing colony

Expansion of established territory

Foodplant considerations

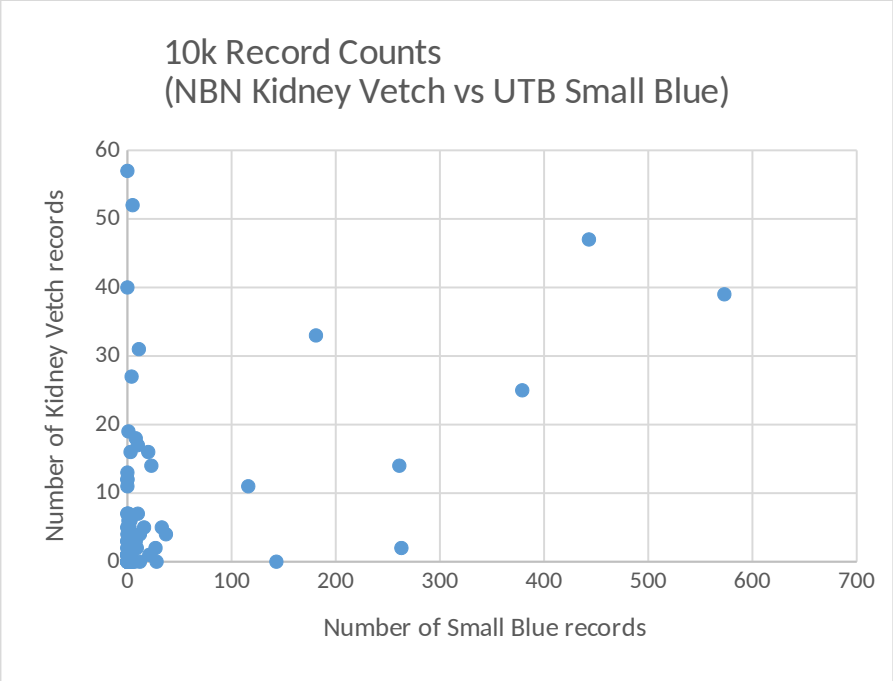
Photo © Andy Spragg, SU751995, 26 May 2020

Larvae of the Small Blue feed exclusively on kidney vetch, and the adult insect appears to be able to travel surprisingly long distances to seek it out and establish new colonies. Furthermore, received wisdom from both Nick Bowles and Grahame Hawker is that the fortunes of the insect and the foodplant are strongly associated: where either is to be found, there also will be found the other. This makes the Small Blue quite different from other species (such as the Brown Hairstreak and Black Hairstreak) which are scarce despite a commonly-occurring foodplant.

In order to identify territory where the Small Blue may be established and yet remain unrecorded, I considered publically-available data[1] on where kidney vetch has historically been recorded. The NBN Atlas data download included 647 records for kidney vetch within UTB territory (admittedly the majority are more than 10 years old).

The diagram below plots, for each UTB 10km square, number of kidney vetch records in the NBN Atlas data set versus number of Small Blue records in the UTB data set. If both data sets were an accurate reflection of the underlying recent reality, we would expect to see “noisy proportionality”. In fact, we see nothing of the kind. Only six 10km squares stand out as characterized by high numbers of records for both Small Blue and Kidney Vetch: SU58, SP91, SU38, SU79, SU69 and SU37. Two more squares stand out as anomalous because they have high numbers of Small Blue records and few or no records for Kidney Vetch: SU89 and SU99.

[1] NBN Atlas occurrence download at https://nbnatlas.org accessed on Sun Jan 03 12:20:43 UTC 2021



The squares of especial potential Small Blue interest here are the ones that are strung out along or near to the vertical axis: squares with a high number of records for Kidney Vetch, and few or no records for Small Blue. From the graph, we can immediately identify five such 10km squares (SP92, SU27, TL01, SP52 and SP31), with more than 20 records for kidney vetch and few or no records for Small Blue. From the point of view of efficient targeted searching, however, the 10km squares of interest are those with records for kidney vetch at a 2km or 1km scale, and no Small Blue Records at all. A full formal analysis, taking into account the grid references at 2km and 1km scales, produces a hit list of 18 such 10km squares, with associated 2km and 1km grid reference detail.

Each 2km or 1km square listed in the table below represents a location that could usefully be checked, for the continued presence of kidney vetch and potential unrecorded presence of Small Blue. 1km grid references (of most interest) are rendered in **bold**; 2km grid references (where no more precise location is recorded) are rendered in *italics*.

10kGR	SqN	Sq#1	Sq#2	Sq#3	Sq#4	Sq#5	Sq#6	Sq#7	Sq#8	Sq#9	Sq#10
SP22	2	*SP2628*	**SP2523**								
SP21	7	**SP2315**	**SP2314**	**SP2111**	*SP2414*	**SP2515**	*SP2412*	*SP2216*			
SU29	2	*SU2298*	**SU2899**								
SP34	1	*SP3844*									
SP32	4	**SP3322**	*SP3228*	**SP3122**	**SP3123**						
SP44	5	**SP4141**	**SP4143**	*SP4248*	*SP4640*	*SP4242*					
SP42	4	**SP4527**	*SP4420*	*SP4022*	*SP4824*						
SP41	8	**SP4015**	**SP4619**	*SP4016*	**SP4511**	*SP4010*	*SP4218*	*SP4610*	**SP4016**		
SP54	1	**SP5841**									
SP53	1	**SP5030**									
SP51	1	**SP5610**									
SU77	2	**SU7371**	**SU7171**								
SU86	1	**SU8669**									
SP92	10	**SP9922**	**SP9822**	**SP9722**	**SP9821**	**SP9920**	**SP9823**	**SP9723**	*SP9024*	*SP9022*	*SP9222*
SU96	2	**SU9368**	**SU9468**								
TL01	10	**TL0018**	**TL0819**	*TL0014*	**TL0019**	*TL0218*	**TL0919**	**TL0219**	**TL0119**	**TL0014**	**TL0114**
TL00	2	*TL0404*	*TL0204*								
TQ09	1	*TQ0694*									