

Butterfly Hibernation Watch

Small Tortoiseshell Numbers Crash due to Poor Spring Weather

Its always a pleasure to find Small Tortoiseshell and Peacock butterflies overwintering in the shed attached to my house in Hertfordshire. In recent years I've kept careful notes of how many there are and what times of the year they arrive and depart. This isn't quite as easy as it seems – both species are adept at hiding away in the darkest recesses out of sight.

In earlier reports I've shown that apparent declines in Small Tortoiseshell numbers in this area are the consequence of early hibernation by first brood individuals. In 2017 for example 23 Small Tortoiseshells entered hibernation between 30 June and 16 July, with no material change in numbers until the following Spring.

I have also recorded considerable differences in the hibernation patterns of Small Tortoiseshells from one year to the next, with great variability in numbers on second and possible part third broods. Correspondence with other recorders around the UK has also shown there can be great variation between different regions in any one year. So, I shouldn't have been surprised that records from 2021 show a very different pattern to all eight previous years for which I have good records.



Results Summary

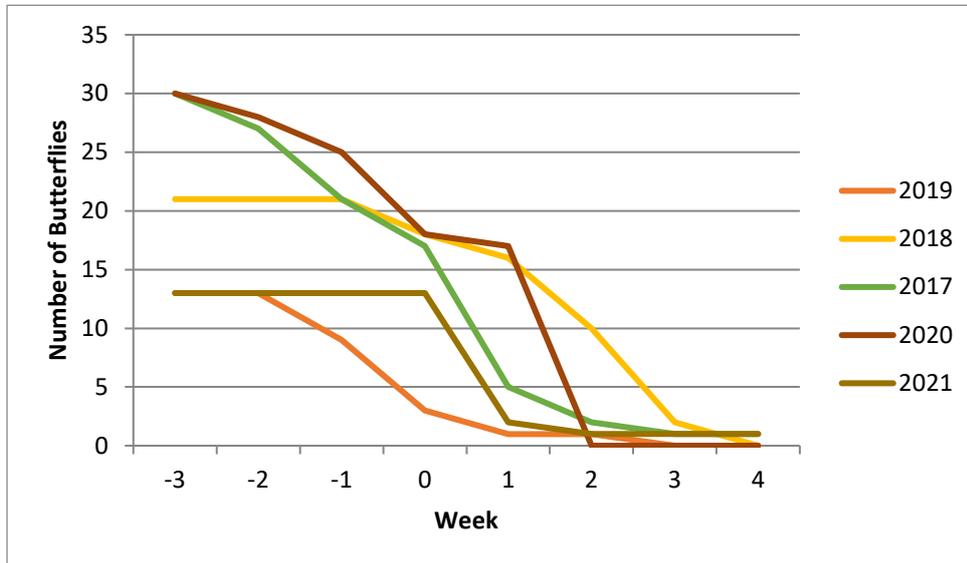
Key points from 2021 transect results for Small Tortoiseshells and Peacocks

- Emergence from hibernation began quite early with the first individuals of both species leaving by 22 February. It took an exceptionally long period before all the butterflies had flown - 10 weeks for Peacocks and 12 weeks before the last Small Tortoiseshell left in early May.
- The peak period for emergence was the last week of March, which is in line with the average. 70% of Small Tortoiseshells and 40% of Peacocks left hibernation during this particularly hot week, when temperatures reached 25 degrees.
- The number of Small Tortoiseshells entering hibernation in the summer crashed to just 5, compared to the average of 20 per year – by far the lowest total since records began.
- By the time of the Big Butterfly Count at the start of August, just one first brood Small Tortoiseshell (20% of the total) had entered hibernation. In all previous years between 50 and 100% of the total number of hibernators were in their over-wintering positions by then.
- In contrast to the massive variation in Small Tortoiseshell behaviour, the data on Peacocks shows a very stable pattern. The number of Peacocks entering hibernation in 2021 was six,

the same as in 2020. The entry period was 7 weeks as in 2020 and started two weeks later, on 4th August.

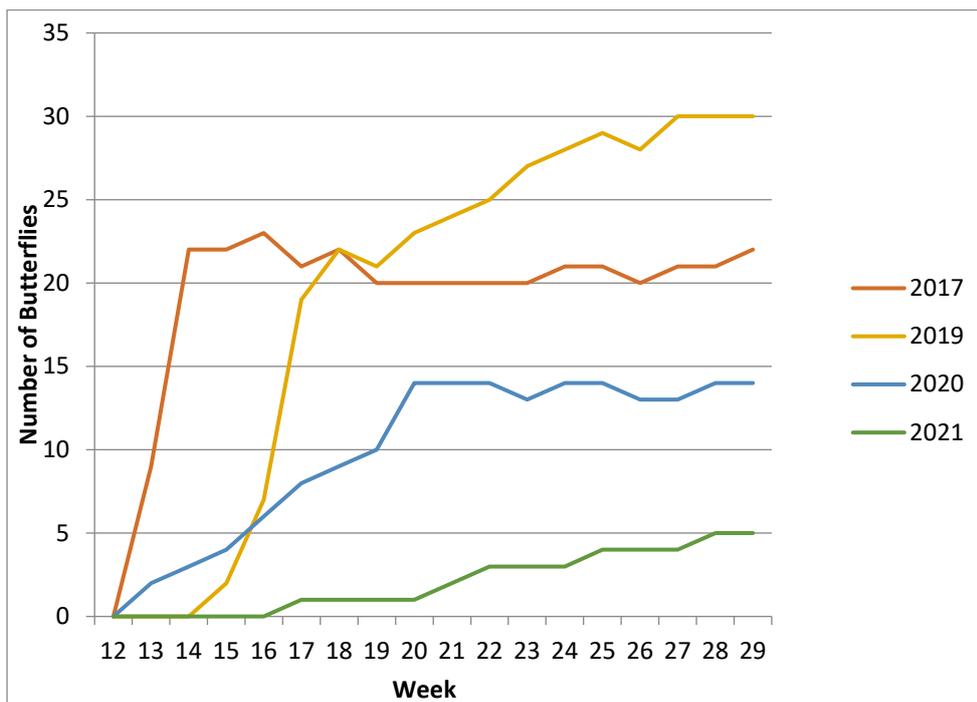
Commentary

Small Tortoiseshell Emergence



In 2021 Small Tortoiseshell emergence followed a fairly normal pattern, with a peak period of emergence at the end of March. However, the pattern of individuals entering hibernation and their overall numbers was radically different.

Small Tortoiseshell Hibernation



Numbers of adults observed flying at local nettles peaked in the last week of March. After that relatively few adults were seen on the wing throughout the rest of the year. Overall abundance of Small Tortoiseshells on transects in Herts & Middx area was down 90% in 2021 compared to the 2015-19 average.

Local weather conditions experienced through most of April were unusual. There were more frosts that month than in any April since 1960 and on average temperatures were colder than March. Rainfall was relatively low and it was the sunniest April since 1919.

The combination of a mass emergence during a warm spell, followed by a prolonged cold and frosty period appears to have greatly reduced and delayed breeding success in the local Small Tortoiseshell population.



When the butterflies emerge in the Spring their water and energy reserves are quite depleted. Their first action is usually to fly straight towards Spring nectar sources such as Dandelions, Primroses and Aubretia. I once saw a Small Tortoiseshell emerge from hibernation and land on vegetation in the middle of my pond where it proceeded to drink for fully 15 minutes. Butterflies with depleted energy reserves are not well placed to withstand a lengthy period of poor weather.

In previous papers I've considered the role of parasites impacting Small Tortoiseshell populations. It is quite clear that there are several species of parasites which do have an impact, but their activity is principally during the summer months.

At the time of writing spider predation has reduced the number of hibernating Small Tortoiseshells from five to just four.



In contrast Peacocks numbers are still doing extremely well. The 2021 total of six hibernators is the joint second-best year to date. The last three years have been the best three years in the shed for this species. Overall abundance of this species on Herts & Middx transects is 40% up on the period 2015-19.

Conclusions

The marked variation in the Spring 2021 weather appears to have been the cause of the Small Tortoiseshells decline. It was the local combination of a warm March week followed quickly by a lengthy cold period in April, which caused problems locally. This type of extreme/volatile weather is associated with climate change, which is likely to affect both people and butterflies in the future.

Small Tortoiseshells have shown themselves to very adaptable in their behaviour and one year's set back will not necessarily present a long-term problem. Small numbers of adults on the wing continued to be observed into Autumn, with five entering hibernation.

I've recorded huge variety in the pattern of Small Tortoiseshell hibernation between different years. Communications from other recorders have shown huge differences within an individual year between parts of the country. Undoubtedly this butterfly is suffering stress due to climate change. Further recording and study of hibernation patterns will be important to give us a better understanding of its life cycle and conservation needs in the future.

Appendix - St Albans Shed Transect - Data Summary

Small Tortoiseshell

Winter (Year)	Maximum Number	Entry Period		% Hibernating by 1st week of Aug	Emergence Period		Period (weeks)
		Earliest	Latest		Earliest	Latest	
2021/22	5	22-Jul	11-Oct	20%			
2020/21	16	24-Jun	23-Oct	63%	12-Feb	09-May	12
2019/20	30	12-Jul	04-Oct	73%	06-Mar	10-Apr	5
2018/19	13	11-Jul	05-Aug	92%	22-Mar	13-Apr	3
2017/18	23	30-Jun	07-Jul	100%	30-Mar	20-Apr	3
2016/17	35	23-Jul	14-Oct	49%	05-Feb	02-Apr	8
2015/16	17	08-Aug	24-Oct	49%	20-Feb	01-May	10
2014/15	14	19-Jul	29-Sep	80%	06-Apr	12-Apr	1
2013/14	28	18-Jul	25-Aug	58%	n/a	26-Apr	
Average	20						

Peacock

Winter (Year)	Maximum Number	Entry Period		Emergence Period		Period (weeks)
		Earliest	Latest	Earliest	Latest	
2021/22	6	04-Aug	24-Sep			
2020/21	6	22-Jul	11-Sep	12-Feb	22-Apr	10
2019/20	13	23-Jul	26-Sep	06-Mar	10-Apr	5
2018/19	3	23-Jul	05-Aug	22-Mar	22-Apr	4
2017/18	0	n/a	n/a	n/a	n/a	
2016/17	1	08-Aug	08-Aug	n/a	n/a	
2015/16	2	08-Aug	08-Aug	n/a	n/a	

2014/15	6	22-Jul	29-Sep	n/k	06-Apr
2013/14	1	18-Aug	18-Aug	n/a	n/a
Average	4				

Reference

- Where have all the Small Tortoiseshells gone? by Malcolm Hull (Mar 2019) [SmallTortoiseshells.pdf \(hertsmiddx-butterflies.org.uk\)](https://hertsmiddx-butterflies.org.uk/SmallTortoiseshells.pdf)
- Small Tortoiseshells – the lost generation (Jan 20) by Malcolm Hull [Small Tortoiseshell: The lost generation \(butterfly-conservation.org\)](https://butterfly-conservation.org/SmallTortoiseshell-The-lost-generation/)
- Hibernating Butterflies by BBC Winterwatch (video shot Nov 2019, broadcast Jan 2020) <https://www.youtube.com/watch?v=B3LrQiXT7yI>
- Where have all the Small Tortoiseshells gone - 2020 report by Malcolm Hull (Butterfly magazine Sept 2020) <https://hertsmiddx-butterflies.org.uk/Butterfly%20Article%20040920.pdf>
- Butterflies of Hertfordshire and Middlesex 2021 by Andrew Wood (publication date Feb 22)

Malcolm Hull

January 2022