DARTINGTON ESTATE, DEVON - BROADLEARS FIELD AGROFORESTRY PROJECT
2018 Butterfly Survey - Final Summary Report

CONTENTS

All photographs taken in Broadlears Field by Steve Turner

DARTINGTON ESTATE, DEVON - BROADLEARS FIELD AGROFORESTRY PROJECT

2018 Butterfly Survey - Final Summary Report

INTRODUCTION

Background to Broadlears Field Agroforestry Butterfly Survey

In 2017 a brief was established for a volunteer to carry out a butterfly survey in connection with the Agroforestry project in Broadlears Field at Dartington, located to the south west of Dartington Hall Gardens and south of Upper Drive. This is a multi-cropping and multi-tenanted agricultural scheme that involves the cultivation of trees and crops alongside each other. The first Survey was carried out in 2017. This Report summarises the findings of the 2018 Butterfly Survey, the first 'full season' survey to have been carried out in Broadlears Field (see Page 3 below).

The site

The Agroforestry project covers a field extending over 48 acres. It is dissected by a service track and on each side, at an angle to the track, the field is planted out with rows of saplings of elderflower, a variety of apple and Sichuan pepper trees. During 2017 and 2018, the wide bands between each of the tree rows have been sown with red clover, which has been subject to periodic harvesting.

Image 1: Elderflower

Image 2: Apple tree

Image 3: Sichuan pepper

Aims of survey

The butterfly survey was instigated in order to provide base data to help measure the levels of biodiversity on the site and to provide indicators of environmental health in the locality. In turn, this time-series data will in due course provide some evidence of the ongoing conservation impact of the agroforestry project.

Method

The survey is carried out on a weekly basis each year between the start of April and the end of September, in accordance with Butterfly Conservation best practice. In 2017, it didn't start until mid-summer, the time when the volunteer was first appointed; as a result the survey took place over 15 consecutive weeks between June and the end of September 2017.

The survey site covers the entire Broadlears Field and this site is divided into 10 survey routes (transects), each of which are walked as part of the survey. There were 8 in 2017 – two new transects were added in 2018 to provide more comprehensive site coverage, and to better reflect the butterfly population of the field and its surroundings. For each transect, the number and species of butterfly identified are recorded on a survey sheet. Wind speed and direction, temperature and sunshine cover are also noted. Transects were identified around the perimeter field margins (in most instances wildflower-rich and defined by hedgerows), along the internal service track margins and along the rows of selected tree species. Depending on the level of butterfly activity recorded and photographs taken, the survey typically takes between one and a half and two hours.

2018 SURVEY FINDINGS

Numbers and species

The total number of butterflies recorded within Transects 1 to 10 during the 26 week survey period (the start of April to the end of September) for 2018 was 915. The highest weekly total was 151 (in Week 14, w/c 2 July) and the lowest was 0 in Week 5 (w/c 30 April) and Week 9 (w/c 28 May). The peak volumes lasted over a period of three consecutive weeks (Weeks 12, 13 and 14) in late June / early July.

The total number of species of butterfly identified during 2018 was 17, as follows:

Meadow Brown (474 counted); Large White (179); Small White (90); Gatekeeper (42); Ringlet (26); Common Blue (22); Speckled Wood (16); Red Admiral (15); Peacock (13); Small Tortoiseshell (11); Orange Tip (8); Comma (6); Green-veined White (6); Painted Lady (4); Brimstone (1); Small Skipper (1); Wall (1) *(Total: 915)*

The largest range of species identified in any week was 11 (Weeks 16 and 17) and the smallest range was 1 (Weeks 1, 2, 4 and 8). In Weeks 5 and 9 however, not a single butterfly was recorded. The three most frequently occurring species were the Meadow Brown (474 - 52%), the Large White (179 - 20%) and the Small White (90 - 10%). The three most infrequent species were the Brimstone (1 - <1%), the Small Skipper (1 - <1%) and the Wall (1 - <1%).

Distribution by Transect

There continues to be a very uneven pattern of distribution of butterflies across transects, as in 2017. The largest numbers (92%) were recorded along the peripheral field margins, including the margins adjacent to the service track dissecting the field. Very few (8%) were found along the rows of planted trees. Butterflies recorded in these locations once again appear to be 'en-route' rather than to be feeding specifically along and within the tree belts. This is notwithstanding the developing

maturity of the various tree species and presence of increasing amounts of seasonal blossom. Details of the distribution of butterflies (by number) for each transect are as follows:

Transect 1 (field margin): 194
Transect 2 (field margin): 162
Transect 3 (field margin): 64
Transect 4 (field margins parallel to central service track): 73
Transect 5 (planted elderflower): 29
Transect 6 (planted apple): 13
Transect 7 (planted Sichuan pepper): 18
Transect 8 (planted apple): 9
Transect 9 (field margin): 148
Transect 10 (field margin): 205

Total all Transects: 915

Image 4: Meadow Brown

Image 5: Speckled Wood

Comparisons between the 2017 and 2018 seasons

A full comparison with findings for the 2017 season is not possible due to the late start of the survey for that year and the fact that eight rather than ten Transects were surveyed. However, where a comparison is possible (during Weeks 12 to 26 and within Transects 1 to 8), there was a decrease of 182 in 2018 over 2017 (510 as compared with 692). The highest weekly totals were registered in the first week of July in both years but were of a different magnitude (160 in 2017 and 95 in 2018). In both years the peak volumes lasted over a period of three consecutive weeks – however, this peak started about two weeks earlier in 2018.

The number of species of butterfly identified during the comparable fifteen week period (Weeks 12 to 26) within Transects 1 to 8 was 18 in 2017 but slightly lower (16) in 2018. The most voluminous species recorded for 2017 was the Meadow Brown and Ringlet. This remains the case in 2018 for the Meadow Brown but is no longer the case for the Ringlet (see Page 5 below). Interestingly, there have been noticeable changes in the actual numbers recorded for individual species.

Within Transects 1 to 8 during the comparable fifteen week periods for 2017 and 2018 (Weeks 12 to 26), *gains in numbers have been recorded in 2018 for several species of butterflies, in particular the Large and Small Whites*

Large White: 2017 - **52** / 2018 - 107
Small White: 2017 - **20** / 2018 - 51
Common Blue: 2017 - **8** / 2018 - 10
Speckled Wood: 2017 - **6** / 2018 – 12

Image 6: Small White

Image 7: Common Blue

These gains have been offset by some notable losses in 2018:

Meadow Brown: 2017 - **329** / 2018 – **253**
Ringlet: 2017 - **148** / 2018 - **15**
Small Skipper: 2017 - **30** / 2018 - **1**
Marbled White: 2017 - **5** / 2018 – **0**
Green veined White: 2017 – **9** / 2018 - **3**
Peacock: 2017 – **14** / 2018 - **5**
Painted lady: 2017 – **8** / 2018 - **2**
Small Tortoiseshell: 2017 – **8** / 2018 - **4**

Image 8: Ringlet

Image 9: Small Skipper

Image 10: Small Tortoiseshell

Image 11: Peacock

In contrast to 2017, there were no sightings in 2018 of the Clouded Yellow, the Small Copper or the Marbled White. Numbers of Brimstone, Comma and Gatekeeper were similar for each year. 2018 saw the recording of a single Wall for the first time, a species absent in 2017.

Image 12: Marbled White

Image 13: Gatekeeper

Image 14: Comma

REFLECTIONS AND ASPIRATIONS

Butterfly numbers

The reasons for the increase in the numbers of some species recorded may stem from the prolonged spells of dry, warm and sunny weather during the summer months, conditions which usually suit adult butterflies. By contrast, there is some speculation that the unusually cold spring may have impacted on the hibernation periods of caterpillars and in turn the butterfly chrysalis stage, leading to the decline in other species. Some food sources, both wildflowers and grasses, also perished earlier than usual due to the extremely high temperatures during June and July. It remains to be seen whether sufficient new greenery has emerged for the healthy development of next season's generation of butterflies.

The introduction of new Transects 9 and 10 in 2018 has proved extremely worthwhile. These peripheral margins are rich in wildflowers and grasses and collectively have yielded a count of over 350 butterflies during the season, the same number that was recorded in Transects 1 and 2. Adding this final 'link in the chain' around Broadlears Field now provides a much more realistic picture of the butterfly habitat relating to the agroforestry project and its setting. Of note is that Transects 9 and 10 jointly accounted for some 55% of all recorded Common Blues and around 41% of Meadow Browns.

Clover cultivation

It was noticeable that in 2017 butterflies were not particularly attracted to the flowering clover in the broad strips that comprise a key element of the agroforestry project. This appears to have been less the case in 2018, when numerous butterflies of varied species (but particularly the Meadow Brown) were seen to be feeding on the clover crop. These flowers continue in the meantime to remain hugely attractive to a vast number and type of bees, and to a variety of moths (including large numbers of the Silver Y moth) that once again shelter within the clover foliage.

Image 15: Bee on clover crop

Image 16: Spring dandelions

The clover crop continues to be particularly invasive, both within the individual tree belts and the wildflower habitats of the field margins. This may have implications for availability of the range of food sources for butterflies in subsequent years if existing species are over-run. The observation made in the 2017 Summary Report still remains pertinent, namely that it may be mutually beneficial (both in terms of the future productivity of the fruit trees and the improvement of the butterfly

feeding habitat) to consider under-planting a mix of wildflowers to attract a wider range of pollinators. This would clearly have resource and maintenance implications for the various agroforestry partners.

Land management and operation of contractors

Three issues have emerged during the 2018 season that are relevant to the long-term integrity of the field margins.

Towards the middle of June, about 35% of Transect 1 was lost as a result of both soil excavation and the creation of an access road by contractors engaged in a development project in an adjoining area of the Estate. This included the removal of a rocky corner area populated by a variety of grasses, the trenching of a long strip of wild flower area, and the cutting of a wider 100m long strip of wild flower area in the main section of the transect. These areas adjoined established hedgerows and were fenced off for about two weeks. The removal of established wildflower margins within a key field margin transect undoubtedly compromised their integrity through removal of a substantial source of food for butterflies feeding in the area. This Transect was by far the highest yielding transect in 2017 (362 butterflies counted) but this fell to 168 during the comparable period of Weeks 12 to 26. This fall of some 200 is likely to have been caused at least in part by these ground works, given the otherwise favourable conditions for butterflies during most of the 2018 season. There was evidence nevertheless of new wildflower growth starting during subsequent weeks and it is to be hoped that the area will regenerate successfully before the 2019 season.

A notable feature of the 2018 season has been the prolonged storage of large numbers of bales of harvested clover within Broadlears Field. By the end of August, there were almost 170 bales remaining, placed on the wildflower margins of Transects 1 and 4, the latter being adjacent to the main service track bisecting the Field. Whilst baling, storing and removal of materials are clearly practical necessities for the tenant farmer, the prolonged storage within the wildflower margins themselves during the butterfly feeding season has undoubtedly led to a reduction in food sources. Storage of the bales within the actual clover field strip areas, once harvested, could resolve this problem.

The third matter to emerge has been the impact of seasonal hedgerow maintenance and the related access requirements. To enable this work to take place, the margins comprising Transects 1, 2 and 3 in particular have been used by vehicles for access for hedge cutting and other presumably related purposes. This has resulted in the crushing of vegetation and in effect the establishment of service tracks within the field margins along the perimeter of the Field.

Fortunately this has not occurred along Transects 9 and 10 (adjoining the boundary of the formal Estate gardens) which are two highly prolific sources of butterfly. In these areas, vehicles requiring access to the Field (most likely to retrieve baled clover) appear to have been driven within the clover strips themselves. This clearly also has an impact on crop productivity but may provide the basis for an alternative approach to how access is gained to different parts of the Field for different reasons, in order to protect wildflower margins.

Future integrity of field margins – a way forward?

These three matters and the issues that they have raised highlight the relative fragility of the margins of wildflowers, tall grasses and hedgerows within the wider ecosystem of the Field.

Maintaining the status quo and working with the current land management practices on the basis that nature will inevitably rectify any occasional damage to Transects would be a pragmatic (do nothing) option. However, it does not address the issues identified above.

Whether or not changes might be beneficial depends on the Trust's vision for Broadlears Field and its ability to manage the inevitable conflicts arising from the operation of a mixed agroforestry enterprise. However, the problems identified above do suggest that action of some sort is required to ensure that on balance the integrity of the field margins is both maintained and enhanced.

A second alternative option would therefore be to raise the 'conservation' status of the Field by introducing positive management of field margins (and tree belts) as wildflower corridors. If embodied in a code of practice, for example, that also sought to improve the various land management practices currently in place, this could bring wider ecological benefits to the agroforestry project by enhancing levels of biodiversity. This is because supporting pollinators provides much needed food not only for butterflies but other pollinating insects essential for the fertilisation of crops and trees. In this context the footnote below is of relevance.

FOOTNOTE

The potential impact of Dan Pearson's Garden Plan on Broadlears Field

It is understood that Dan Pearson's Landscaping Plan for the future of Dartington Hall Gardens is to be implemented in stages, and that not every aspect of it will ultimately be adopted. Nevertheless, it is noted that the plan for the area of the garden known as 'El Dorado' is for children's play equipment within the trees. A concern is that it is also planned for an extension of that area to join with the clump of trees on the eastern side of Broadlears Field known as the 'Roundel', as the part of the Plan known as 'Play'.

The issue here arises from the potential loss of the tranquillity of Broadlears Field and the consequential impact on the wildlife that works in harmony with the field. For example, the Sichuan pepper crop has been attacked by voles. As a result, raptor poles have been installed to encourage raptors and to allow the numbers of voles to be controlled in a way that does not have a negative impact on the organic crops. Kestrels, buzzards and barn owls are all known to hunt in the area. Destroying the quiet of the field could discourage the raptors from hunting here. Further, the integrity of the 'Roundel' as a home for wildlife could be undermined by this aspect of the Garden Landscape Plan. Hitherto, the Roundel has probably remained undisturbed for many decades and it is likely to be a refuge for many species, some of which no doubt support the biodiversity and effectiveness of the agroforestry project.

Steve Turner - Dartington Volunteer (November 2018)

APPENDIX 1

Plan of Broadlears Agroforestry Field and location of Butterfly Transects