Butterfly Surveys, Knepp Castle Estate, 2013

Transect Survey, Northern & Middle Blocks (with reference to surveys July 2005 – 2012)

Introduction

Butterflies have been the subject of annual surveys, usually in July, for a total of nine years (2005-13 inclusive), as part of the overall monitoring programme to assess the effects of the naturalistic grazing regime first implemented in 2001 and since expanded over much of the Knepp Castle Estate. These surveys of the Northern and Middle Blocks were initially conducted by Rich Howarth of the Sussex Wildlife Trust, but in 2012 the task of monitoring butterflies over the wider Wildland project area was taken on by Neil Hulme, Conservation Adviser for the Sussex Branch of Butterfly Conservation.

The methodology previously employed by Rich Howarth has been maintained for the Northern and Middle Blocks; namely the standard UKBMS Transect technique, the details of which have been described in earlier reports. The key feature to note is the subdivision of the Transect route into 26 recording 'parcels'.

This year the Transect was again walked over two days, as it has proven difficult to complete the route within a single day, during the hours when butterflies are likely to be on the wing. This year the Transect was walked on 1st and 3rd August. Although July dates are considered preferable for consistency, such minor differences in timing are unlikely to impact on comparisons with historical data.

Summary

Species diversity reached its highest level (23 species) since surveying commenced in 2005, providing the firmest indication yet that some species are reacting positively to habitat change across the Northern and Middle Blocks.

The significant increase in both abundance and spread of the Green-veined White observed in 2012 was maintained and improved upon this year. The most likely explanation is an increase in the abundance of various crucifers around hedge bases, ditches and other damper areas.

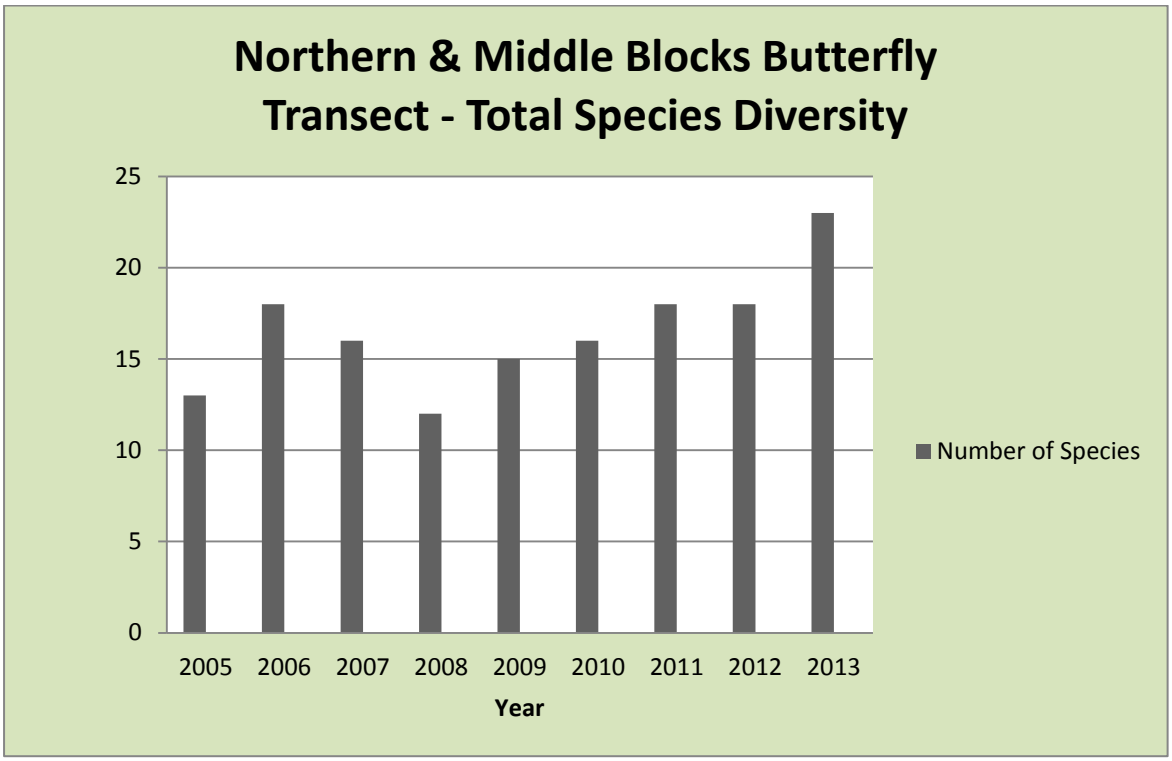
The 2012 increase in abundance and spread of the Essex Skipper was not maintained this year. However, the closely related Small Skipper did appear in greater numbers and over a wider area than in previous years. When looked as a group, these 'golden skippers' do appear to be doing well across the Northern & Middle Blocks, but it will be necessary to observe a sustained trend over a period of several more years before firmer conclusions can be drawn.

The significant increase in abundance and diversity of butterflies observed in Transect parcel 9 (particularly over Saddleback, east of Horsham Common) during 2012 was maintained this year. Again, this is probably due to an increased incidence of thistle (*Cirsium spp.*), which provides a good source of nectar and draws butterflies in from a wide area.

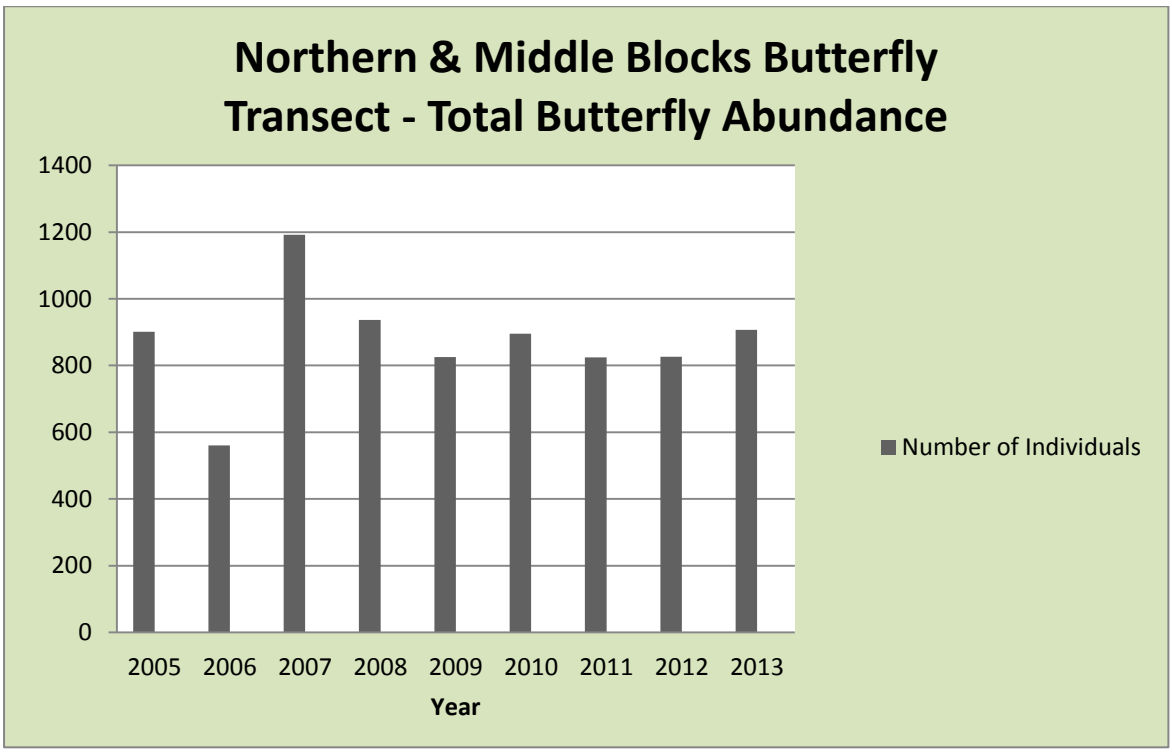
Increases in species diversity (but not butterfly abundance) were noted in Transect parcels 12, 21 and 22 this year. It is too early to draw any specific conclusions from this data.

Total butterfly numbers over the survey area remained at a similar level to that observed throughout the 2005 – 2012 period, particularly since 2008.

Results



This bar chart shows the total number of species seen (species diversity) along the Transect route across the Northern and Middle Blocks between 2005 and 2013.



This bar chart shows the total number of butterflies counted along the Transect route across the Northern and Middle Blocks between 2005 and 2013.

NORTHERN & MIDDLE BLOCKS BUTTERFLY TRANSECT – TRANSECT SECTIONS: SPECIES DIVERSITY									
Parcel Number	2005 Species	2006 Species	2007 Species	2008 Species	2009 Species	2010 Species	2011 Species	2012 Species	**2013 Species**
1	4	6	1	5	7	3	6	1	**2**
2	3	7	6	4	5	5	9	2	**4**
3	1	1	4	4	1	2	3	1	**5**
4	4	9	8	6	9	7	11	5	**6**
5	3	6	5	5	8	4	9	8	**10**
6	4	4	5	6	7	7	7	5	**7**
7	5	9	6	7	7	3	6	4	**10**
8	6	7	8	8	7	9	10	7	**9**
9	1	4	4	7	4	6	4	9	**11**
10	3	2	9	5	8	3	3	3	**5**
11	3	4	3	3	5	5	2	5	**6**
12	2	4	5	4	6	4	3	7	**11**
13	3	5	3	4	2	2	4	4	**5**
14	2	3	4	5	8	5	2	6	**6**
15	5	7	6	4	5	4	1	4	**7**
16	2	1	2	3	5	1	2	2	**5**
17	4	5	4	4	6	5	5	4	**5**
18	2	5	3	3	2	2	2	4	**3**
19	3	3	5	5	3	6	3	2	**6**
20	1	1	1	2	1	2	1	3	**2**
21	3	2	3	5	1	4	2	5	**9**
22	4	2	2	4	1	4	1	4	**7**
23	No data	No data	No data	No data	No data	No data	No data	2	**0**
24	3	0	0	2	0	1	1	0	**1**
25	3	0	2	2	1	0	1	3	**4**
26	3	0	1	2	1	0	1	2	**3**
ALL	13	18	16	12	15	16	18	18	**23**

This table shows the total number of species seen (species diversity) in each of the 26 recording parcels along the Transect route across the Northern and Middle Blocks between 2005 and 2013.

NORTHERN & MIDDLE BLOCKS BUTTERFLY TRANSECT – TRANSECT SECTIONS: ABUNDANCE OF INDIVIDUALS									
Parcel Number	2005 Individuals	2006 Individuals	2007 Individuals	2008 Individuals	2009 Individuals	2010 Individuals	2011 Individuals	2012 Individuals	**2013 Individuals**
1	30	31	7	23	17	4	24	10	**8**
2	6	17	32	30	30	68	57	16	**35**
3	4	1	6	4	1	13	3	1	**8**
4	90	57	163	160	151	66	90	64	**46**
5	61	42	92	96	106	106	177	125	**59**
6	19	11	20	11	21	50	38	12	**34**
7	70	103	45	64	38	73	32	26	**76**
8	64	45	63	60	43	103	89	41	**74**
9	10	32	31	64	31	32	16	124	**136**
10	13	10	18	24	24	20	15	6	**18**
11	28	20	10	11	5	39	6	6	**12**
12	27	19	52	62	87	54	55	85	**64**
13	33	33	74	36	12	7	23	18	**13**
14	26	24	130	42	109	71	16	41	**77**
15	51	32	23	9	26	23	1	22	**67**
16	14	4	30	27	41	5	7	15	**24**
17	95	37	86	45	26	56	41	64	**58**
18	42	14	38	22	10	3	18	25	**11**
19	44	10	77	40	16	50	24	16	**20**
20	10	1	25	6	5	5	7	20	**2**
21	12	14	42	26	1	35	19	40	**24**
22	75	3	89	49	12	10	28	28	**28**
23	No data	No data	No data	No data	No data	No data	No data	4	**0**
24	48	0	0	2	0	2	1	0	**1**
25	5	0	27	14	9	0	16	13	**8**
26	24	0	12	10	4	0	1	4	**4**
ALL	901	560	1192	937	825	895	824	826	**907**

This table shows the total number of butterflies counted in each of the 26 recording parcels along the Transect route across the Northern and Middle Blocks between 2005 and 2013.

NORTHERN & MIDDLE BLOCKS BUTTERFLY TRANSECT – RECORDED SPECIES: TOTAL ABUNDANCE									
Species	2005 Abundance	2006 Abundance	2007 Abundance	2008 Abundance	2009 Abundance	2010 Abundance	2011 Abundance	2012 Abundance	**2013 Abundance**
Small Skipper	35	23	1	38	9	8	21	15	**62**
Essex Skipper	3	0	33	0	0	11	9	41	**15**
Large Skipper	2	1	1	2	2	1	6	0	**5**
Clouded Yellow	0	1	0	0	0	0	0	0	**1**
Brimstone	2	1	0	0	0	0	0	6	**2**
Large White	9	62	27	45	24	18	20	3	**55**
Small White	15	16	19	42	36	20	70	0	**7**
Green-veined White	0	4	4	2	3	6	5	43	**124**
Purple Hairstreak	0	2	1	0	0	0	0	1	**1**
Small Copper	0	0	0	0	1	5	3	1	**2**
Small Blue	0	1	0	0	0	0	0	0	**0**
Brown Argus	0	0	1	0	0	0	2	0	**0**
Common Blue	0	21	0	0	1	43	1	1	**2**
Holly Blue	0	0	0	0	0	0	0	1	**0**
White Admiral	0	0	1	0	0	0	0	1	**0**
Purple Emperor	0	0	0	0	0	0	0	0	**1**
Red Admiral	0	3	0	0	0	2	7	0	**1**
Painted Lady	0	7	2	0	313	0	0	0	**2**
Small Tortoiseshell	0	0	0	0	0	0	0	1	**1**
Peacock	1	0	4	17	19	1	2	2	**19**
Comma	2	2	0	4	8	1	2	2	**6**
Silver-washed Fritillary	13	16	26	19	34	59	38	20	**60**
Speckled Wood	5	6	5	10	9	9	17	6	**6**
Marbled White	0	0	0	1	0	2	1	1	**4**
Gatekeeper	198	179	92	138	131	332	187	154	**164**
Meadow Brown	611	214	974	619	233	377	431	527	**364**
Ringlet	5	1	1	0	2	0	2	0	**3**

TOTAL SPECIES = 27

This table shows the total number of butterflies of each species counted along the Transect route across the Northern and Middle Blocks between 2005 and 2013.

NORTHERN & MIDDLE BLOCKS BUTTERFLY TRANSECT – RECORDED SPECIES: FREQUENCY (IN PARCELS)									
Species	2005 Frequency	2006 Frequency	2007 Frequency	2008 Frequency	2009 Frequency	2010 Frequency	2011 Frequency	2012 Frequency	**2013 Frequency**
Small Skipper	5	5	1	9	3	4	8	6	**11**
Essex Skipper	1	0	11	0	0	4	4	15	**5**
Large Skipper	1	1	1	1	2	1	3	0	**2**
Clouded Yellow	0	1	0	0	0	0	0	0	**1**
Brimstone	1	1	0	0	0	0	0	5	**2**
Large White	7	13	13	16	12	5	7	3	**19**
Small White	7	7	12	17	11	8	10	0	**4**
Green-veined White	0	3	4	2	3	4	4	14	**21**
Purple Hairstreak	0	1	1	0	0	0	0	1	**1**
Small Copper	0	0	0	0	1	2	3	1	**1**
Small Blue	0	1	0	0	0	0	0	0	**0**
Brown Argus	0	0	1	0	0	0	1	0	**0**
Common Blue	0	6	0	0	1	9	1	1	**2**
Holly Blue	0	0	0	0	0	0	0	1	**0**
White Admiral	0	0	1	0	0	0	0	1	**0**
Purple Emperor	0	0	0	0	0	0	0	0	**1**
Red Admiral	0	3	0	0	0	2	4	0	**1**
Painted Lady	0	4	2	0	11	0	0	0	**2**
Small Tortoiseshell	0	0	0	0	0	0	0	1	**1**
Peacock	1	0	3	10	8	1	1	2	**8**
Comma	2	2	0	4	6	1	1	1	**4**
Silver-washed Fritillary	3	5	6	5	9	6	4	7	**10**
Speckled Wood	3	5	4	4	3	3	4	4	**4**
Marbled White	0	0	0	1	0	2	1	1	**4**
Gatekeeper	23	17	17	16	17	19	17	15	**18**
Meadow Brown	26	21	22	24	22	23	24	23	**24**
Ringlet	1	1	1	0	1	0	2	0	**3**

TOTAL SPECIES = 27

This table shows the total number of recording parcels in which each species of butterfly was seen (frequency) along the Transect route across the Northern and Middle Blocks between 2005 and 2013.

Interpretation

1) The first bar chart (Northern & Middle Blocks Butterfly Transect – Total Species Diversity) shows that species diversity reached its highest level (23 species) since surveying commenced in 2005, providing the firmest indication yet that some species are reacting positively to habitat change across the Northern and Middle Blocks. This is a significant increase over the 13 species observed in 2005, and the lowest figure of 12 for 2008. The previous high of 18 species was recorded in 2006, 2011 and 2012.
2) The second bar chart (Northern & Middle Blocks Butterfly Transect – Total Butterfly Abundance) shows that the total number of butterflies counted has remained remarkably consistent, particularly over the last six years. Given the limitations of a single Transect method survey each year (including weather) and the predominance in July of the ubiquitous Meadow Brown and Gatekeeper (together contributing 58% towards the total count in 2013), this is perhaps unsurprising. Species diversity and trends amongst more specialised butterflies are more likely to reflect improvements in habitat quality, and may ultimately prove to be more sensitive indicators of change.
3) The first two tables (Northern & Middle Blocks Butterfly Transect – Transect Sections: Species Diversity and Northern & Middle Blocks Butterfly Transect – Transect Sections: Abundance Of Individuals) demonstrate a further, significant improvement in Transect parcel 9 (particularly over Saddleback, east of Horsham Common – see 2012 report). A species diversity of 11 compares well with a 2005 – 2011 average of 4. Similarly, a total count of 136 butterflies signals a marked increase over the 2005 – 2011 average of 31. This is probably attributable to an increased incidence of thistle (*Cirsium* spp.), which provides a good source of nectar and draws butterflies in from a wide area.

   Increases in species diversity (but not butterfly abundance) were noted in Transect parcels 12, 21 and 22 this year, recorded at 11, 9 and 7 species, up from 2005 – 2012 averages of 4, 3 and 3 species. It is too early to draw any specific conclusions from this data, although an increase in the incidence of thistle (*Cirsium*spp.) may explain the increase in Transect parcel 12 (over Mars, north of Pondtail Farm).
4) The second two tables (Northern & Middle Blocks Butterfly Transect – Recorded Species: Total Abundance and Northern & Middle Blocks Butterfly Transect – Recorded Species: Frequency [In Parcels]) demonstrate that the significant increase in both abundance and spread of the Green-veined White observed in 2012 was maintained and improved upon this year.

   The total number of Green-veined Whites recorded was 124, comparing well with a 2005 – 2011 average of 3. It was observed in 21 of the recording parcels, up from 14 in 2012. This increase in the abundance and spread of the Green-veined White appears to be of significance. The caterpillar feeds on a range of wild crucifers including Garlic Mustard (*Alliaria petiolata*), Cuckooflower (*Cardamine pratensis*), Hedge Mustard (*Sisymbrium officinale*), Water- cress (*Rorippa nasturtium-aquaticum*), Charlock (*Sinapis arvensis*), Large Bitter-cress (*C. amara*), Wild Cabbage (*Brassica oleracea*) and Wild Radish (*Raphanus raphanistrum*). The increase in abundance and spread of the Green-veined White may be attributable to an increased abundance of some of these plants around hedge bases, ditches and other damper areas.

   The 2012 increase in abundance and spread of the Essex Skipper was not maintained this year. However, the closely related Small Skipper did appear in greater numbers and over a wider area than in previous years. When looked as a group, these 'golden skippers' do appear to be doing well across the Northern & Middle Blocks, but it will be necessary

to observe a sustained trend over a period of several more years before firmer conclusions can be drawn. The total number of Small Skippers recorded was 62, significantly up on the 2005 – 2012 average of 19. It was observed in 11 of the recording parcels (2005 – 2012 average 5). The Small Skipper caterpillar feeds mainly on Yorkshire Fog grass (*Holcus lanatus*).

Timed Count Survey, Southern Block, May 2013

Introduction

In 2012 the decision was taken to increase the number and spread of butterfly surveys across the Wildland project area. Two of these additional, annual surveys focus on a fixed route, planned to cover a variety of habitats over part of the Southern Block. The route was determined during a visit in June 2012 (see 2012 report), although subsequent surveys, including this one, are carried out during May; one of the aims being to record species which potentially occur on the Estate, but which fly earlier in the year, thus avoiding 'capture' by the original recording regime.

The methodology employed for these two surveys is significantly different to the standard UKBMS Transect technique employed for the Northern and Middle Blocks area. The Transect technique does have limitations when only performed on a single day each year, rather than the recommended 26 weekly repetitions. These Southern Block surveys will be conducted as Timed Counts, with a standardised period of recording being spent (flexibly) within each of the named survey sections (e.g. 'Sallow Fields') along the route. A more generous survey corridor will be allowed (20 m width, rather than 5 m) and there will be no ceiling to the recording cube, allowing for the easier 'capture' of arboreal species. There will be no requirement to walk at a steady, rapid pace, so that more interesting habitat patches can be examined more thoroughly, potentially allowing for the sighting of less common butterflies; indeed some species are notoriously adept at avoiding inclusion within Transect counts. Wind speed, cloud cover and temperature will be recorded. Precise details of this Southern Block route, including the time limits for each survey section, are appended to this year's report (see Timed Count survey route map).

Summary

This survey recorded relatively few butterflies (12), probably reflecting the prolonged, cold spring weather. In the early part of the season the butterfly calendar ran three weeks later than the C21st average.

Results

SOUTHERN BLOCK BUTTERFLY SURVEY (TIMED COUNT) – MAY 2013											
	Survey Section										
Species	Green Lane Approach	Green Lane	Pen Bridge North	Pen Bridge West	The Strip	Brookhouse Farm	Sallow Fields	Grasslands	Woodland Block	Emperor Walk	**Total Species Counts**
Large White	1					1					**2**
Small White	2	1									**3**
Green-veined White	2										**2**
Orange Tip	2	1									**3**
Holly Blue										1	**1**
Small Heath								1			**1**
TOTAL SECTION COUNTS	**7**	**2**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**12**
TOTAL SECTION SPECIES	**4**	**2**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	

TOTAL SPECIES = 6

This table shows the number of butterflies of each species counted in each named survey section (e.g. 'Sallow Fields') along the Timed Count survey route across the Southern Block in May 2013.

Interpretation

1) This survey recorded relatively few butterflies (12), probably reflecting the prolonged, cold spring weather. In the early part of the season the butterfly calendar ran three weeks later than the C21st average. A return to more seasonal conditions next year will hopefully see an improved yield.
2) Of the butterflies observed, the most notable were the Orange Tip and Small Heath, a UK Biodiversity Action Plan (UKBAP) Priority Species (for research only). The caterpillar food-plants are Lady's Smock (*Cardamine pratensis*) and Garlic Mustard (*Alliaria petiolata*) for the Orange Tip, and fine grasses, especially fescues (*Festuca* spp.), meadow-grasses (*Poa* spp.) and bents (*Agrostis* spp.) for the Small Heath. Both species may prove useful in monitoring habitat changes across the Southern Block.

Timed Count Survey, Southern Block, July 2013

Introduction

In 2012 the decision was taken to increase the number and spread of butterfly surveys across the Wildland project area. Two of these additional, annual surveys focus on a fixed route, planned to cover a variety of habitats over part of the Southern Block. This particular survey, conducted on 26th July, was designed to 'capture' high summer species over a previously (pre-2012) unsampled area of the Estate.

The methodology employed for these two surveys is significantly different to the standard UKBMS Transect technique employed for the Northern and Middle Blocks area. The Transect technique does have limitations when only performed on a single day each year, rather than the recommended 26 weekly repetitions. These Southern Block surveys will be conducted as Timed Counts, with a standardised period of recording being spent (flexibly) within each of the named survey sections (e.g. 'Sallow Fields') along the route. A more generous survey corridor will be allowed (20 m width, rather than 5 m) and there will be no ceiling to the recording cube, allowing for the easier 'capture' of arboreal species. There will be no requirement to walk at a steady, rapid pace, so that more interesting habitat patches can be examined more thoroughly, potentially allowing for the sighting of less common butterflies; indeed some species are notoriously adept at avoiding inclusion within Transect counts. Wind speed, cloud cover and temperature will be recorded. Precise details of this Southern Block route, including the time limits for each survey section, are appended to this year's report (see Timed Count survey route map).

Summary

The July survey revealed an impressive number and diversity of butterflies, with 1137 individuals and 23 species being recorded across this part of the Southern Block. This is significantly more than the 549 individuals and 16 species recorded in 2012. However, after only two years of data collection it is difficult to interpret the significance of these increases, particularly when considering the influence of weather; 2012 was the worst year on record for butterflies across the UK.

Of particular interest is the number of Purple Emperor butterflies recorded; 12 specimens over 8 survey sections. This is quite remarkable, given that this is an uncommon and highly elusive species, more usually associated with oak-rich, mixed woodland habitats. This species is discussed in much greater detail in the Single Species (Purple Emperor) survey report which follows.

Results

SOUTHERN BLOCK BUTTERFLY SURVEY (TIMED COUNT) – JULY 2013											
	Survey Section										
Species	Green Lane Approach	Green Lane	Pen Bridge North	Pen Bridge West	The Strip	Brookhouse Farm	Sallow Fields	Grasslands	Woodland Block	Emperor Walk	**Total Species Counts**
Small Skipper	4	4	13	33	2	21	1	15		6	**99**
Essex Skipper		1				2		3		3	**9**
Large Skipper				1	3	1				3	**8**
Brimstone		1									**1**
Large White	7	8	4	2	3	6	4	6		3	**43**
Small White	4	1	1	1	1	2	1			4	**15**
Green-veined White	11	12	5	8	11	6	4	9	1	7	**74**
Purple Hairstreak	1			2	1		2				**6**
Holly Blue	1										**1**
Chalkhill Blue				1						1	**2**
Small Copper			1								**1**
Purple Emperor		3	1	1	1	3	1	1		1	**12**
White Admiral									1		**1**
Red Admiral		1				1	1			1	**4**
Peacock			2	9	1	6	1			7	**26**
Small Tortoiseshell				2	3						**5**
Comma	1	2	1	2	1	3	2	5	1	4	**22**
Silver-washed Fritillary						1					**1**
Marbled White	2	1	3	17	4	6	1	5		2	**41**
Speckled Wood		1									**1**
Gatekeeper	11	42	25	79	11	28	10	31	5	32	**274**
Meadow Brown	25	82	39	62	38	75	40	53	13	61	**488**
Ringlet	1	2									**3**
TOTAL SECTION COUNTS	**68**	**161**	**95**	**220**	**80**	**161**	**68**	**128**	**21**	**135**	**1137**
TOTAL SECTION SPECIES	**11**	**14**	**11**	**14**	**13**	**14**	**12**	**9**	**5**	**14**	

TOTAL SPECIES = 23

This table shows the number of butterflies of each species counted in each named survey section (e.g. 'Sallow Fields') along the Timed Count survey route across the Southern Block in July 2013.

Interpretation

1) The July survey revealed an impressive number and diversity of butterflies, with 1137 individuals and 23 species being recorded across this part of the Southern Block. This is significantly more than the 549 individuals and 16 species recorded in 2012. However, after only two years of data collection it is difficult to interpret the significance of these increases, particularly when considering the influence of weather; 2012 was the worst year on record for butterflies across the UK.

   Several widespread and quite common species may prove useful in monitoring habitat changes across the Southern Block, namely Small Skipper, Green-veined White and Marbled White.
2) Of particular interest is the number of Purple Emperor butterflies recorded; 12 specimens over 8 survey sections. This is quite remarkable, given that this is an uncommon and highly elusive species, more usually associated with oak-rich, mixed woodland habitats. There can be little doubt that the Purple Emperor has reacted spectacularly to the development of Sallow (*Salix* spp.) scrub over large areas of the Southern Block, providing the butterfly with very extensive breeding habitat. This species is discussed in much greater detail in the Single Species (Purple Emperor) survey report which follows.
3) Although there is no suitable breeding habitat for the species, and none is likely to develop, the beautiful Chalkhill Blue provides a welcome addition to the record list. Two male butterflies made the long journey from downland colonies to the south.
4) Unsurprisingly, the Meadow Brown and Gatekeeper dominated the assemblage, contributing 67% to the total count.

Single Species Survey (Purple Emperor), Southern Block, July 2013

Introduction

In 2013 several additional butterfly surveys were added to the already improved and extended programme (see 2012 report) covering the Wildland project area. In addition to the more formalised UKBMS style Transect (2005 onwards), Timed Counts (2012 onwards) and Brown Hairstreak egg searches (winter 2012/2013 onwards), there will now be focused, Single Species surveys for the Purple Emperor. This species is invariably under-recorded by most standardised survey methods, due to its arboreal lifestyles and highly elusive habits.

The methodology employed is very informal, involving a search of the areas considered most likely to reveal the presence of the butterfly, based on detailed knowledge of the species' autecology. As this requires a considerable level of experience, the results are not necessarily repeatable by other observers.

Summary

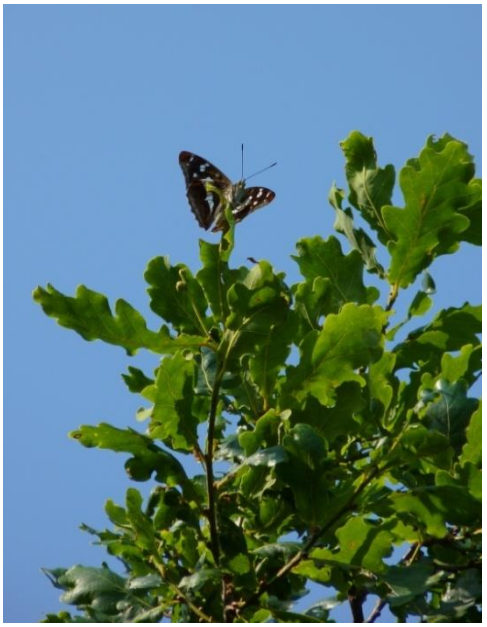
On 20th and 21st July 2013 Matthew Oates and Neil Hulme (NH) surveyed a large area within the Southern Block, specifically to determine to what extent the Purple Emperor has colonised the Wildland Project area. This was followed up with a short evening survey on 24th July by NH. Results were somewhat surprising, with 84 and 72 individuals being recorded on consecutive days over different areas, and a further 30 on the evening of 24th July. These remarkable statistics suggest that the Knepp Castle Estate now supports the UK's second strongest population of this rare and elusive species.

Results

20th July 2013: 84 Purple Emperors recorded in tetrads TQ1319, TQ1320, TQ1420 and TQ1421. Fields/areas surveyed include Green Lane (full length, western edge), Brookhouse 11, Brookhouse 12, Brookhouse 10, Brookhouse 9, Brookhouse 8, Wagstaffs Wood, Woggs Bottom, Woggs Bottom Wood, Oak Field, Honeypools House and Woggs.

21st July 2013: 71 Purple Emperors recorded in tetrads TQ1320, TQ1321, TQ1419, TQ1420 and TQ1421. Fields/areas surveyed include Tree Field, Blacksmiths Lagg, Blacksmiths Front, Brookhouse E, Oaklands Lagg, Honeypools Barn North, Honeypools Barn, Twenty Seven Acres, Hammer, Rainbow, Waterworks West, Tory Copse and Wickwood Copse.

24th July 2013: 30 Purple Emperors recorded in tetrads TQ1420 and TQ1421. Fields/areas surveyed include Green Lane (north part), Woggs, Oak Field, Honeypools House, Rainbow, Hammer, Twenty Seven Acres and Woggs Bottom.



Interpretation

1) Surveys conducted by Purple Emperor expert Matthew Oates at Knepp in 2009 found that this species was just starting to breed in the extensive sallow (*Salix* spp.) scrub developing over former arable land. Prior to then, it probably occurred only intermittently over the Wildland project area, wandering in from woods to the north and

south east during good summers and dying out during poor summers. In 2012, a very poor year for almost all butterflies, the Purple Emperor surprisingly appeared during a Timed Count survey of the Southern Block. This was followed by further records in 8 out of 10 sections within the equivalent 2013 survey.

2) On 20th and 21st July 2013 Matthew Oates and Neil Hulme (NH) surveyed a large area within the Southern Block, specifically to determine to what extent the Purple Emperor has colonised the Wildland Project area. This was followed up with a short evening survey on 24th July by NH. Results were somewhat surprising, with 84 and 72 individuals being recorded on consecutive days over different areas, and a further 30 on the evening of 24th July.
3) Due to the almost linear habitat (most males collecting on the medium to large oaks (*Quercus robur*) along field margins), and speed of survey, it is considered that significant 'double counting' is highly unlikely and these totals probably provide a rather conservative reflection of total population size. To place these figures in context, the woodlands to the north of the A272 ('Southwater Woods') are considered to be the species' stronghold in Sussex, providing sightings of c.20 individuals per day in the very best seasons.
4) The Knepp Estate now appears to hold the UK's second strongest population of this rare and elusive species. This is especially significant as the butterfly almost invariably occurs at low population level and very few really sizeable colonies are known. Only the famous Fermyn Woods complex in Northants can better these statistics. This very strong population has developed remarkably quickly and, as the areas of sallow (*Salix* spp.) scrub develop further over the estate, it is considered likely that the population of Purple Emperor will continue to increase.
5) These observations demonstrate quite clearly that the Purple Emperor should not be considered as a species confined to mature, oak-rich woodland habitats. It is clearly able to thrive in much more open countryside, in areas where suitable specimens of its food-plant (*Salix* spp.) grow in profusion.
6) The Purple Emperor is a much sought-after species and the presence of such a strong population on the estate is likely to draw considerable interest from wildlife enthusiasts in the future.

Brown Hairstreak Egg Survey, All Blocks, Winter 2012/2013

Introduction

Winter Brown Hairstreak butterfly egg surveys are now included as part of the extended Knepp Castle Estate Wildland monitoring programme, initiated during 2012. This short report sets out the preliminary findings of searches conducted over five areas in the Southern Block during the early part of 2013 by Neil Hulme, Conservation Adviser for the Sussex Branch of Butterfly Conservation. Surveys were performed over a total period of seven hours, on 17th January and 1st March 2013.

The methodology employed is straightforward and easily repeatable, involving a timed count over areas where suitable blackthorn growth occurs. A measure of their relative density is achieved by calculating the number of eggs discovered per hour of searching.

Summary

The initial survey of Brown Hairstreak eggs over five areas within the Southern Block revealed highly variable densities, ranging from zero discoveries per hour, to 23. The most productive area was along the eastern margin of field Brookhouse 5 (grid ref: TQ135197), which is quite close to the Brown Hairstreak master trees (male assembly area) discovered on 22nd August 2012 at the Hooklands Lane/Green lane intersect (grid ref: TQ134193).

In three of the areas the egg densities (1 – 4 discoveries per hour) are consistent with the activity of females dispersing from the core area of the loosely defined colonies which typify Brown Hairstreak population structure. The browsing action of herbivores has probably significantly reduced the number of eggs in all areas.

Results

BROWN HAIRSTREAK EGG SURVEY (TIMED COUNT) ALL BLOCKS – WINTER 2012/2013					
Survey Area	Broomers Corner SE	Oaklands Lagg, Oaklands 6, Brookhouse B	Green Lane Approach	Brookhouse 4, Brookhouse 5 (west), Brookhouse 6	Brookhouse 5 (east)
Grid Ref	TQ1320	TQ1320	TQ134195	TQ1319 & TQ1320	TQ135197
Date	17/1/2013	17/1/2013	1/3/2013	1/3/2013	1/3/2013
Time	1 hour	2 hours	1 hour	2 hours	1 hour
Number Eggs	3	8	1	0	23
Eggs Per Hour	3	4	1	0	23

TOTAL EGGS = 35

This table shows the number of Brown Hairstreak eggs found in each survey area and their relative density, measured as the number of eggs discovered per hour by searching suitable blackthorn growth.

Interpretation

1) The first four areas searched (as arranged in the table above) yielded very modest results, ranging from zero to 4 eggs per hour of searching. These results are typical for areas of the wider landscape in which Brown Hairstreak occurs, but which are situated some distance from epicentres of activity, including the assembly trees around which males congregate and breeding occurs. Females are known to disperse over long distances away from these areas, laying eggs at low densities. Evidence of browsing of the food-plant, which can result in the removal of a high percentage of the eggs laid, was noted as being widespread over all these areas.
2) The fifth area examined, running close to the fence-line along the eastern margin of field Brookhouse 5 (grid ref: TQ135197), produced a count of 23 eggs in one hour. Despite the heavily grazed nature of blackthorn suckers in this area, which will undoubtedly have resulted in the removal of a large number of eggs, this represents an unusually high density, reflecting the activity of probably half a dozen or more female butterflies. This is perhaps unsurprising, given the quite close proximity of the area to the Brown Hairstreak master trees (male assembly area) discovered on 22nd August 2012 at the Hooklands Lane/green lane intersect (grid ref: TQ134193).

   The image to the right depicts a pair of Brown Hairstreak eggs which has narrowly escaped incidental loss through browsing, probably by deer.