Butterfly Surveys, Knepp Castle Estate, 2012

Transect Survey, Northern & Middle Blocks (with reference to surveys July 2005 – 2011)

Introduction

Butterflies have been the subject of annual surveys, usually in July, for a total of eight years (2005-12 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 Richworth 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 walked over two days, as the additional time spent ensuring replication of the exact route precluded completion within an acceptable timeframe. It was also walked later in the year than ideal (10th and 12th August), due to the backlog of other survey work resulting from such poor summer weather. However, the cool, wet summer actually set the butterfly calendar back by two weeks relative to the 21st Century average, so results are remarkably consistent with 2005 – 2011 data. A single July date will be reinstated in 2013.

The precise route of previous walks could not be followed in three places, due to both logistical and environmental factors. Although every attempt should always be made to follow the predetermined route as closely as possible, the enforced changes (adopting the 'nearest fit') are unlikely to skew the overall picture to any significant extent.

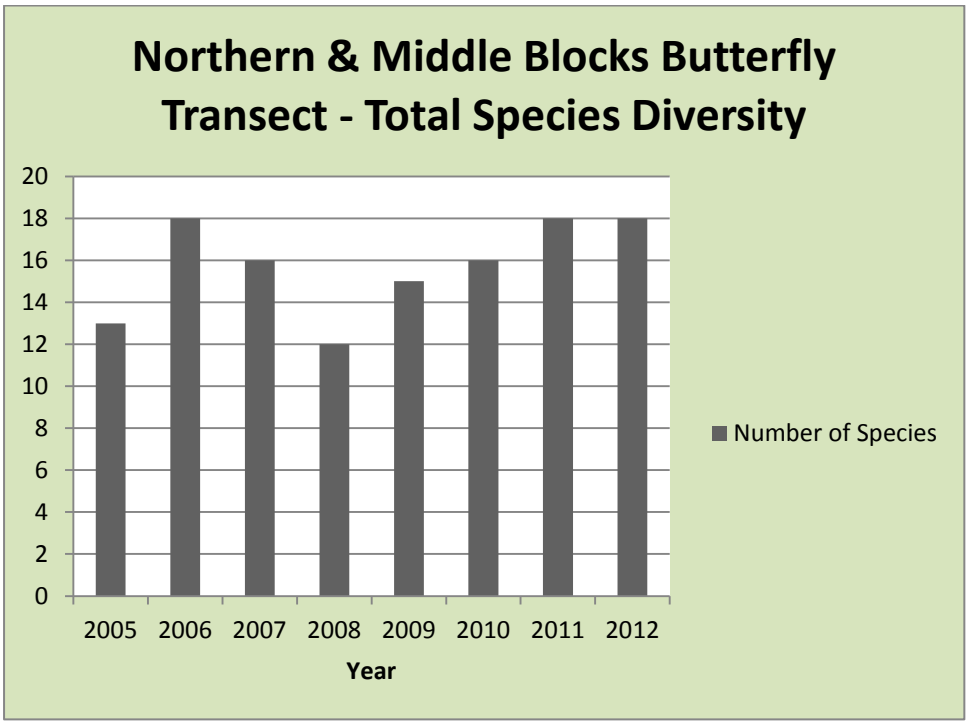
Summary

Despite 2012 being an exceptionally poor year for butterflies, the significant increases in both abundance and spread of the Essex Skipper and Green-veined White provide the first, tentative indications that some species are reacting positively to habitat change in the Northern and Middle Blocks. The most likely explanation is an increase in the availability of larval food-plants; for the Essex Skipper, a greater abundance of grasses such as Cock's-foot (*Dactylis glomerata*) across former arable fields and pasture; for the Green-veined White, a greater abundance of various crucifers around hedge bases, ditches and other damper areas. However, it will be necessary to observe a sustained trend over a period of several years before firmer conclusions can be drawn.

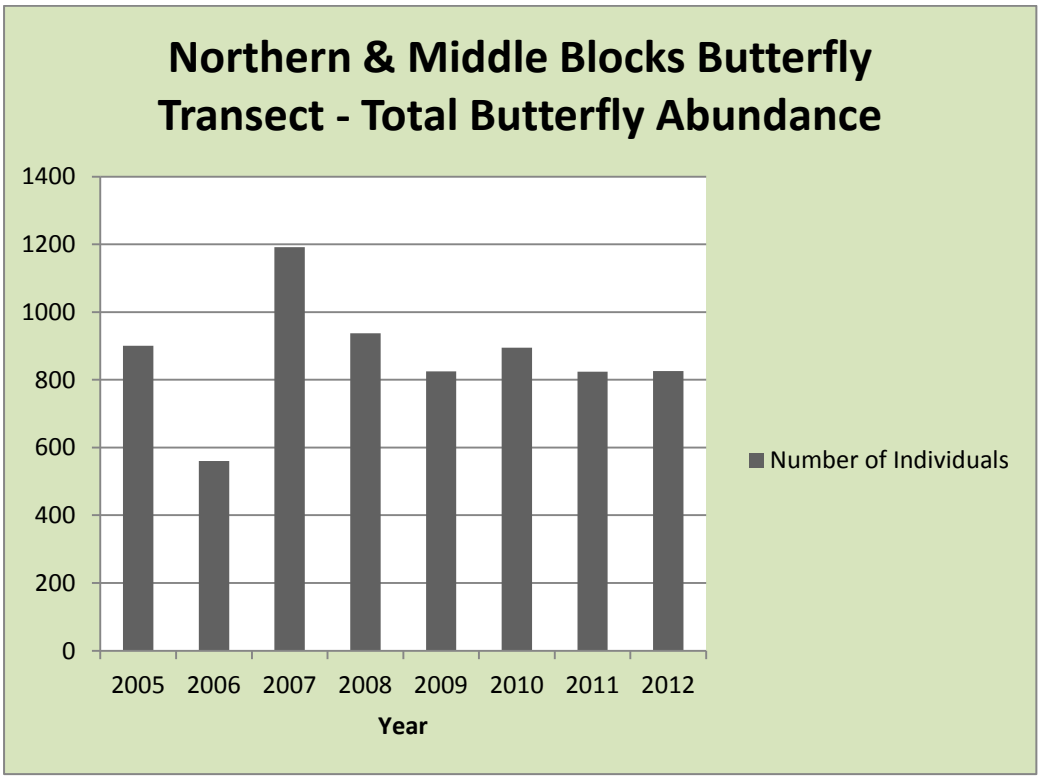
A significant increase in abundance and diversity of butterflies was observed in Transect parcel 9 (particularly over Saddleback, east of Horsham Common), probably due to an increased incidence of thistle (*Carduus spp.*), which provides a good source of nectar and draws butterflies in from a wide area.

Species diversity over the Northern and Middle Blocks was maintained at the highest level yet recorded (18 species), equalling the figures for 2006 and 2011.

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 2012.



This bar chart shows the total number of butterflies counted along the Transect route across the Northern and Middle Blocks between 2005 and 2012.

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	05 - 11 Average	**2012 Species**
1	4	6	1	5	7	3	6	5	**1**
2	3	7	6	4	5	5	9	6	**2**
3	1	1	4	4	1	2	3	2	**1**
4	4	9	8	6	9	7	11	8	**5**
5	3	6	5	5	8	4	9	6	**8**
6	4	4	5	6	7	7	7	6	**5**
7	5	9	6	7	7	3	6	6	**4**
8	6	7	8	8	7	9	10	8	**7**
9	1	4	4	7	4	6	4	4	**9**
10	3	2	9	5	8	3	3	5	**3**
11	3	4	3	3	5	5	2	4	**5**
12	2	4	5	4	6	4	3	4	**7**
13	3	5	3	4	2	2	4	3	**4**
14	2	3	4	5	8	5	2	4	**6**
15	5	7	6	4	5	4	1	5	**4**
16	2	1	2	3	5	1	2	2	**2**
17	4	5	4	4	6	5	5	5	**4**
18	2	5	3	3	2	2	2	3	**4**
19	3	3	5	5	3	6	3	4	**2**
20	1	1	1	2	1	2	1	1	**3**
21	3	2	3	5	1	4	2	3	**5**
22	4	2	2	4	1	4	1	3	**4**
23	No data	No data	No data	No data	No data	No data	No data	No data	**2**
24	3	0	0	2	0	1	1	1	**0**
25	3	0	2	2	1	0	1	1	**3**
26	3	0	1	2	1	0	1	1	**2**
ALL	13	18	16	12	15	16	18	15	**18**

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 2012.

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	05 – 11 Average	**2012 Individuals**
1	30	31	7	23	17	4	24	19	**10**
2	6	17	32	30	30	68	57	34	**16**
3	4	1	6	4	1	13	3	5	**1**
4	90	57	163	160	151	66	90	111	**64**
5	61	42	92	96	106	106	177	97	**125**
6	19	11	20	11	21	50	38	24	**12**
7	70	103	45	64	38	73	32	61	**26**
8	64	45	63	60	43	103	89	67	**41**
9	10	32	31	64	31	32	16	31	**124**
10	13	10	18	24	24	20	15	18	**6**
11	28	20	10	11	5	39	6	17	**6**
12	27	19	52	62	87	54	55	51	**85**
13	33	33	74	36	12	7	23	31	**18**
14	26	24	130	42	109	71	16	60	**41**
15	51	32	23	9	26	23	1	24	**22**
16	14	4	30	27	41	5	7	18	**15**
17	95	37	86	45	26	56	41	55	**64**
18	42	14	38	22	10	3	18	21	**25**
19	44	10	77	40	16	50	24	37	**16**
20	10	1	25	6	5	5	7	8	**20**
21	12	14	42	26	1	35	19	21	**40**
22	75	3	89	49	12	10	28	38	**28**
23	No data	No data	No data	No data	No data	No data	No data	No data	**4**
24	48	0	0	2	0	2	1	8	**0**
25	5	0	27	14	9	0	16	10	**13**
26	24	0	12	10	4	0	1	7	**4**
ALL	901	560	1192	937	825	895	824	876	**826**

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 2012.

NORTHERN & MIDDLE BLOCKS BUTTERFLY TRANSECT – RECORDED SPECIES: TOTAL ABUNDANCE									
Species	2005 Abundance	2006 Abundance	2007 Abundance	2008 Abundance	2009 Abundance	2010 Abundance	2011 Abundance	05 – 11 Average	**2012 Abundance**
Small Skipper	35	23	1	38	9	8	21	19	**15**
Essex Skipper	3	0	33	0	0	11	9	8	**41**
Large Skipper	2	1	1	2	2	1	6	2	**0**
Clouded Yellow	0	1	0	0	0	0	0	<1	**0**
Brimstone	2	1	0	0	0	0	0	<1	**6**
Large White	9	62	27	45	24	18	20	29	**3**
Small White	15	16	19	42	36	20	70	31	**0**
Green-veined White	0	4	4	2	3	6	5	3	**43**
Purple Hairstreak	0	2	1	0	0	0	0	<1	**1**
Small Copper	0	0	0	0	1	5	3	1	**1**
Small Blue	0	1	0	0	0	0	0	<1	**0**
Brown Argus	0	0	1	0	0	0	2	<1	**0**
Common Blue	0	21	0	0	1	43	1	9	**1**
Holly Blue	0	0	0	0	0	0	0	0	**1**
White Admiral	0	0	1	0	0	0	0	<1	**1**
Red Admiral	0	3	0	0	0	2	7	2	**0**
Painted Lady	0	7	2	0	313	0	0	46	**0**
Small Tortoiseshell	0	0	0	0	0	0	0	0	**1**
Peacock	1	0	4	17	19	1	2	6	**2**
Comma	2	2	0	4	8	1	2	3	**2**
Silver-washed Fritillary	13	16	26	19	34	59	38	29	**20**
Speckled Wood	5	6	5	10	9	9	17	9	**6**
Marbled White	0	0	0	1	0	2	1	<1	**1**
Gatekeeper	198	179	92	138	131	332	187	180	**154**
Meadow Brown	611	214	974	619	233	377	431	494	**527**
Ringlet	5	1	1	0	2	0	2	2	**0**

TOTAL SPECIES = 26

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 2012.

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	05 – 11 Average	**2012 Frequency**
Small Skipper	5	5	1	9	3	4	8	5	**6**
Essex Skipper	1	0	11	0	0	4	4	3	**15**
Large Skipper	1	1	1	1	2	1	3	1	**0**
Clouded Yellow	0	1	0	0	0	0	0	<1	**0**
Brimstone	1	1	0	0	0	0	0	<1	**5**
Large White	7	13	13	16	12	5	7	10	**3**
Small White	7	7	12	17	11	8	10	10	**0**
Green-veined White	0	3	4	2	3	4	4	3	**14**
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	<1	**0**
Brown Argus	0	0	1	0	0	0	1	<1	**0**
Common Blue	0	6	0	0	1	9	1	2	**1**
Holly Blue	0	0	0	0	0	0	0	0	**1**
White Admiral	0	0	1	0	0	0	0	<1	**1**
Red Admiral	0	3	0	0	0	2	4	1	**0**
Painted Lady	0	4	2	0	11	0	0	2	**0**
Small Tortoiseshell	0	0	0	0	0	0	0	0	**1**
Peacock	1	0	3	10	8	1	1	3	**2**
Comma	2	2	0	4	6	1	1	2	**1**
Silver-washed Fritillary	3	5	6	5	9	6	4	5	**7**
Speckled Wood	3	5	4	4	3	3	4	4	**4**
Marbled White	0	0	0	1	0	2	1	<1	**1**
Gatekeeper	23	17	17	16	17	19	17	18	**15**
Meadow Brown	26	21	22	24	22	23	24	23	**23**
Ringlet	1	1	1	0	1	0	2	1	**0**

TOTAL SPECIES = 26

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 2012.

Interpretation

1) The first bar chart (Northern & Middle Blocks Butterfly Transect – Total Species Diversity) shows that species diversity was maintained at the highest level yet recorded (18 species), equalling the figures for 2006 and 2011. It remains too early within the timeframe of the project to draw any conclusions.
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 five 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 82% towards the total count in 2012), 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 an improvement in Transect parcel 9 (particularly over Saddleback, east of Horsham Common) despite this being a generally poor year for butterflies, as witnessed by the remaining data. A species diversity of 9 compares well with a previous best of 7 and a 2005 – 2011 average of 4. Similarly, a total count of 124 butterflies signals a marked increase over a previous best of 64 and a 2005 – 2011 average of 31. This is probably attributable to an increased incidence of thistle (*Carduus* spp.), which provides a good source of nectar and draws butterflies in from a wide area.
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 marked increases in both the abundance and spread of the Essex Skipper and Green-veined White. Recognising the limitations of a single Transect method survey each year (including weather), a greater significance can be attributed to any such data if it is viewed in the wider context of the seasonal fortunes of those species on a regional level. To this end the document 'Summary of the 2012 Butterfly Year in Sussex' is hyperlinked to this report. Neither species did better than average across the region.

   The total number of Essex Skippers recorded was 44, comparing well with a previous best of 33 and a 2005 – 2011 average of 8. It was observed in 15 of the recording parcels, compared to a previous best of 11 and 2005 – 2011 average of 3. This increase in abundance and spread of the Essex Skipper may prove to be of significance, although it will be necessary to observe a sustained trend over a period of several years before firmer conclusions can be drawn. The main food-plant of the caterpillar is Cock's-foot (*Dactylis glomerata*), although the butterfly may use several other grasses including Creeping Soft-grass (*Holcus mollis*), Common Couch (*Elytrigia repens*), Timothy (*Phleum pratense*), Meadow Foxtail (*Alopecurus pratensis*), False Brome (*Brachypodium sylvaticum*), and Tor-grass (*B. pinnatum*). It rarely uses Yorkshire-fog (*Holcus lanatus*), the preferred foodplant of the similar looking Small Skipper. The increase in abundance and spread of the Essex Skipper might be attributable to an increased abundance of some of these grasses across former arable fields and pasture.

   The total number of Green-veined Whites recorded was 43, comparing well with a previous best of 6 and a 2005 – 2011 average of 3. It was observed in 14 of the recording parcels, compared to a previous best of 4 and 2005 – 2011 average of 3. This

increase in the abundance and spread of the Green-veined White may prove to be of significance, although it will be necessary to observe a sustained trend over a period of several years before firmer conclusions can be drawn. 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 might be attributable to an increased abundance of some of these plants around hedge bases, ditches and other damper areas.

Timed Count Survey, Southern Block, June (Future Surveys In May)

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 on 17th June 2012 (this survey), although in future years the timing will be brought forward to May; one of the aims being to record butterfly species which potentially occur on the Estate, but which fly earlier in the year and cannot be 'captured' by the current 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 the 'capture' 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, will be published in 2013.

Summary

This particular survey recorded relatively few butterflies due to its mid June timing, this being a typically unproductive period. However, in future years it will be conducted during May, when it is hoped that some species with a spring flight period might be recorded.

Of the butterflies observed, the most notable was Small Heath, a UK Biodiversity Action Plan (UKBAP) Priority Species (for research only). 29 specimens were recorded over 4 survey sections.

Results

SOUTHERN BLOCK BUTTERFLY SURVEY (TIMED COUNT) – JUNE 2012 (FUTURE SURVEYS IN MAY)											
	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 Skipper										1	**1**
Large White					1						**1**
Small White			1			1					**2**
Green-veined White				1							**1**
Holly Blue				1			1				**2**
Red Admiral	4	3									**7**
Speckled Wood	2							2			**4**
Meadow Brown		2	2	2		8	4	4			**22**
Small Heath			3	8		3		15			**29**
TOTAL SECTION COUNTS	**6**	**5**	**6**	**12**	**1**	**12**	**5**	**21**	**0**	**1**	**69**
TOTAL SECTION SPECIES	**2**	**2**	**3**	**4**	**1**	**3**	**2**	**3**	**0**	**1**	

TOTAL SPECIES = 9

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 June 2012.

Interpretation

1) This particular survey recorded only 69 individual butterflies and a diversity of only 9 species. However, these results are unsurprising given that this reconnaissance visit was made during the 'June gap'; this being the period between the disappearance of many spring species and the appearance of most summer butterflies. In future years this survey will be conducted during May.
2) Of the butterflies observed, the most notable was Small Heath, a UK Biodiversity Action Plan (UKBAP) Priority Species (for research only). 29 specimens were recorded over 4 survey sections, with the most productive being Pen Bridge West and Grasslands. Although no baseline data exists, this species has probably increased over the Wildland area since the project began, particularly in dry, well-drained, more heavily grazed situations where the sward is short and sparse. The caterpillar feeds on fine grasses, especially fescues (*Festuca* spp.), meadow-grasses (*Poa* spp.) and bents (*Agrostis* spp.).

Timed Count Survey, Southern Block, July

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 29th July, was designed to 'capture' high summer species over a previously 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 the 'capture' 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, will be published in 2013.

Summary

This survey recorded a healthy number (549) and diversity (16 species) of butterflies, dominated by the Meadow Brown and Gatekeeper (together contributing 87% towards the total count in 2012), a similar situation to that seen in the Northern and Middle Blocks area.

Several species of interest and potential significance were observed, including the Green-veined White (common and widespread), Marbled White and Small Copper. The most exciting record was that of a male Purple Emperor, seen over the oaks along a former field margin in the Pen Bridge West survey section. Previously (16th July 2009), while in the company of Matthew Oates, a female was observed laying eggs in an area of sallow scrub, within the survey section now named Emperor Walk.

Results

SOUTHERN BLOCK BUTTERFLY SURVEY (TIMED COUNT) – JULY 2012											
	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			6	1		1		4		2	**14**
Essex Skipper										2	**2**
Large Skipper		2									**2**
Large White	1					1					**2**
Green-veined White	3	7	12		1	3		1	1	1	**29**
Purple Hairstreak		1		1							**2**
Small Copper			1		1					1	**3**
Purple Emperor				1							**1**
Red Admiral	1	1			1	2			1		**6**
Comma		1								1	**2**
Silver-washed Fritillary						2					**2**
Marbled White			3		1	1					**5**
Gatekeeper	4	23	18	23	9	13	4	19	2	19	**134**
Meadow Brown	4	14	33	42	47	63	9	70	8	52	**342**
Ringlet			1								**1**
Small Heath			2								**2**
TOTAL SECTION COUNTS	**13**	**49**	**76**	**68**	**60**	**86**	**13**	**94**	**12**	**78**	**549**
TOTAL SECTION SPECIES	**5**	**7**	**8**	**5**	**6**	**8**	**2**	**4**	**4**	**7**	

TOTAL SPECIES = 16

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 2012.

Interpretation

1) Several species of interest and potential significance were observed, including the Green-veined White (common and widespread), Marbled White and Small Copper. However, it may take a further five years or more before any trends in these and/or other species become evident, bearing in mind the absence of baseline data.

2) The most exciting record was that of a male Purple Emperor, seen over the oaks along a former field margin in the Pen Bridge West survey section. Previously (16th July 2009), while in the company of Matthew Oates, a female was observed laying eggs in an area of sallow scrub, within the survey section now named Emperor Walk. This led Oates to comment "It looks as though *iris* is quite an early coloniser. Again, here it is by no means a woodland butterfly, let alone a creature of dense forest. It needs sallow jungles, sallow-rich landscapes. I'm not even sure if it needs tall trees ....". This is a particularly impressive and exciting species to watch in the future.

Casual Records, All Blocks

In 2012 the decision was taken to increase the number and spread of butterfly surveys across the Wildland project area. The expanded programme will now include a winter survey of Brown Hairstreak eggs, to be undertaken annually and covering all blocks in sequence. Bearing in mind that this will often be conducted after the submission of an annual report, each survey will be reported on in the following year's summary. However, the Brown Hairstreak has already been recorded in 2012, bringing the total number of butterfly species seen by Howarth and Hulme over the Wildland project area to 29. On 22nd August 3 male Brown Hairstreaks were observed in a master tree (male assembly point) at the Hooklands Lane/green lane intersect (grid ref: TQ134193), and 3 ova were easily located on blackthorn scrub near Broomer's Corner (grid ref: TQ131209), during the Wildland project gathering held on 13th November.

During a further reconnaissance visit on 7th September, good numbers of Red Admiral (12) and Comma (17) were seen within the Southern Block, across the area bounded by grid ref: TQ1420.