

# Great Dixter Estate Biodiversity Audit 2018

## Butterfly Survey



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## 1. Introduction

There is strong public interest in the status of butterflies nationally, so collection of accurate data and understanding of their habitat requirements allows effective communication of the best conservation and importantly, garden management to aid their survival.

Butterflies are the canaries in the mine of conservation: They are sensitive to changes in habitat and climate change; their numbers in the U.K are in decline and they are relatively easy to see allowing detection of changes in the environment.

Data from the 1920s collected by Oliver Lloyd, brother of Christo, has been lost but a small number of his collection survive to give historical context to the current surveys. Previous transect data show that butterfly species found on the Dixter Estate are amongst those which have shown declines nationally (Fox, 2015, Blencoe M. and Hulme N. 2017, [www.ukbutterflies.org](http://www.ukbutterflies.org) 20.07.18.) Earlier data sets suggest that Dixter has potential to become a regionally important site in the East Sussex High Weald for butterflies and other invertebrates, ( Williamson C.E.2016, [www.ukbutterflies.org](http://www.ukbutterflies.org) 20.07.18. Phillips A. 2017).

## 2. Survey Methodology

### 2.1 Annual Fixed Transect Survey (Appendix i)

Weekly surveys give an overall picture of population size in a given year. An abundance curve produced within a season shows the distribution of occupancy and aids analysis of the suitability of habitats within the garden and estate and their inter-relationship.

In addition to the flight paths careful observation of plant species utilised for egg laying and nectar sources was undertaken.

All butterfly species potentially present in the habitats found at Great Dixter were surveyed.

The route taken over a period of 1 hour in accordance with Sutherland W.J (Ed) 2006 and UKBMS guidelines, covers the formal gardens, meadows, woodland and pasture as follows :

#### 2.1.1 S1.Kitchen Drive

A mix of meadow and formal garden within the Yew hedge boundary

#### 2.1.2 S2.Prairie

Pond, meadow and vegetable garden outside the formal gardens and Yew hedge

#### 2.1.3 S3.High Garden and Long Border

Formal gardens bounded by yew hedge and meadow

#### 2.1.4 S4.Orchard Meadow

Wild flower meadow adjoining the formal gardens and the lower moat pond.

#### 2.1.5 S5.New Meadow

Recreated meadow in approximately the last 10 years adjoining Four Acre Shaw and the lower moat pond.

#### 2.1.6 S6.Four Acre Shaw

Ancient woodland which has not been recently coppiced

#### 2.1.7 S7.Pasture

Sheep grazed pasture adjoining Four Acre Shaw

#### 2.1.8 S8.Nursery Drive and Barn Garden

Managed native hedgerow and grassy areas and enclosed formal gardens

### 2.2 Presence Survey, Weights Wood (Appendix ii)

Species difficult to detect on a walked transect can be detected by the increased effort of timed counts for specific species in a smaller area. Weekly visits of 1 hour per species in key locations between 1st June and 31st August to give maximum range of flight season allowing for seasonal fluctuations in weather affecting emergence of adults.

#### 2.2.1 Habitat Description Weights Wood

Weights Wood is a distinct 12 hectares area of Ancient Sandstone Ghyll Woodland situated approximately 0.5 km from the Eastern Rother at between 40-45m above sea level 13km from the south coast and English Channel at Rye. A detailed description of the flora is currently underway and can be seen in the Great Dixter Ecological Survey and Assessment 2007, Environmental Research & Advisory Partnership Preston, Lancashire (Appendix iii).

It is separated from the Great Dixter formal gardens by a heavily grazed pasture and annually cut mixed deciduous hedgerows. It has been coppiced and planted with mixed Sweet Chestnut, Hornbeam, hazel and Oak in previous generations. Coppicing re-started ten years ago for timber.

The current survey area followed a main ride across the 12 hectare site (Appendix ii), with good stands of mature Honeysuckle, young Goat Willow, mature Oaks around a pond bay and large areas of young flowering Brambles. There are disconnected small numbers of Common Dog Violets.

Given the indicator larval food plants present, the following species were surveyed:

White Admiral (BAP species)

Purple Emperor, (No previous records in East Sussex)

Purple hairstreak

Small and Pearl Bordered Fritillary were not included as their larval food plant, Violet, numbers were so low and heavily shaded.

The survey dates were moved forward by 2 weeks to take account of the hot weather and 2017 survey data from West Sussex, ([www.UKBMS](http://www.UKBMS) 2017.)


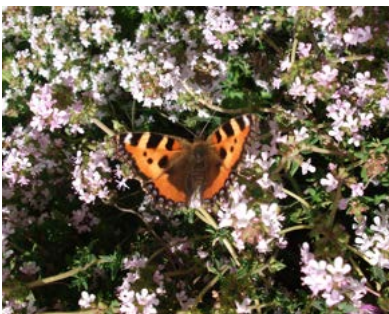

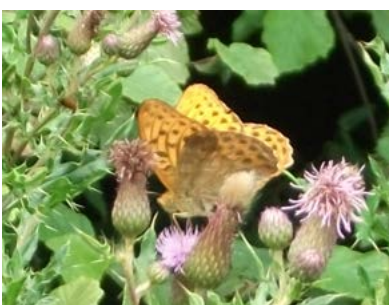
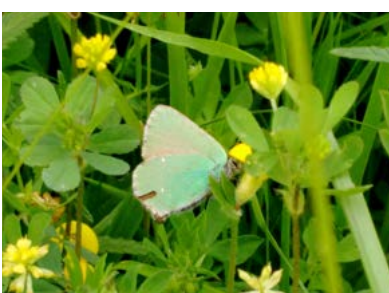
### 3. Results

#### 3.1 Fixed Transect

A total of 767 sitings of 26 species between April 1st until September 30th. The highest number of different species (15) occurred in the meadows and the formal gardens (7). Sitings drastically fell following the meadows being cut.

##### 3.1.2 Table Of Results Appendix vi

##### 3.1.3 Significance of Species Conservation Status.

	<p>Small Copper despite a decline in abundance of -19% it is not yet of conservation concern and its occurrence has shown a slight increase of +5% (UK BAP 2017.)</p>
	<p>Small Tortoiseshell is of conservation concern in the south of England where its numbers show decline (UK BAP 2017.)</p>
	<p>Common Blue shows long general decline although this species is not yet of conservation concern (UK BAP 2017.)</p>
	<p>Silver Washed Fritillary is a species of conservation concern but its abundance and occurrence show increases of +6% and +55% respectively, (UK BAP 2017.)</p>
	<p>Green Hairstreak shows a decline in abundance of -34% and occurrence of -14% and its conservation status is under review.</p>

### 3.2 Weights Wood Presence Survey




All three species surveyed were sighted in the space of one week and around two weeks earlier than expected possibly due to the very warm conditions.

White Admiral numbers were especially good (20). Purple Emperor is a first record for this part of Sussex.

### 3.2.1 Table Of Results

Date	Time	Species	TQ
18.6.18	12:00	White Admiral x1	8250 2550
21.6.18	12:00	White Admiral x 20 Purple hairstreak x2	8250 2550
22.6.18	14:30	Purple Emperor x1	8255 2555

### 3.2.2 Significance of Species Conservation Status

	<p>Purple Emperor is a species of conservation concern showing an abundance change of -35% but an occurrence change of +135% (UK BAP 2017.)</p>
	<p>White Admiral is a UK BAP priority species showing a decline in abundance of -45% and occurrence of -14% (UK BAP 2017.)</p>
	<p>Purple Hairstreak is not of conservation concern but abundance and occurrence show a decline of -10% and -15% respectively, (UK BAP 2017.)</p>

## 4. Species Habitat Resources in Fixed Transect Area

Adequate larval food plants are the critical factor in population distribution. A supply of nectar, minerals from decaying matter, sap runs, water and



overwintering sites are also key. Climatic conditions have the greatest influence on total numbers recorded on the day.

#### 4.1 Presence of Species in association with Larval Food Plants

##### 4.1.1. Cruciferae and Pieridae

Early Pieridae, Orange Tip are best adapted to *Cardamine pratensis* (Mansell E. and Newman H. 1968). Caterpillars feed on the developing seed pods and overwinter as chrysalis on the lower stems, so leaving plants uncut is essential to their development. They are cannibalistic as caterpillars so over-competition for food plants will reduce numbers. The New Meadow along the woodland edge and the Prairie close to the horse pond had the best numbers of Orange Tip.

Green Vein White whilst able to utilise a range of Cruciferae require litter or proximity of shaded undergrowth to pupate and overwinter on the ground (Mansell E and Newman H 1968). Best numbers were seen in the New Meadow close to the habitat pile of dead wood. Later species, Small White and Large White can utilise a broad range of Cruciferae and over winter on stems or nearby walls and fences. They were well distributed throughout the garden.

##### 4.1.2. Alder Buckthorn and Brimstone

The caterpillars of Brimstone only feed on *Rhamnus Fragula* (Alder Buckthorn) and *R. cathartica* (Purging Blackthorn). They prefer leaves on 2nd year terminal shoots (Mullis M. 2005), so annual cutting can reduce available food supply. They were most prominent along the hedges of the Prairie and the Nursery Drive.

##### 4.1.3 Grasses and Satyridae and Hesperidae.

Speckled Wood favoured sunlit glades in woodland and require grasses, showing better success on *Dactylis glomerata*. Low numbers were present Four Acre Shaw and in the New Meadow along the woodland edge.

Gate Keeper, Meadow Brown and Ringlet are catholic in the grasses upon which they lay their eggs. They overwinter as caterpillar low down in grass tussocks so areas of thatch aid their success. The pasture along the boundary with Four Acre Shaw supported the highest populations of all three species.

Large Skipper shows a preference for *Holcus lanata* and *Dactylis glomerata*, whilst Small Skipper show a preference for and select with care *Bromus lepidus* to lay eggs. These hatch and immediately hibernate as caterpillars for around ten or eleven months, coming out to feed at night. In spring individuals spin a silk tent formed by several blades of grass and emerge in summer. Standing grassland that is not cut and baled is essential to their success. The Pasture had the best population of Small Skipper.

#### 4.1.4 Nettles and Nymphalidae

The stinging Nettle, *Urtica dioica* is the larval food plant of the Red Admiral, Small Tortoiseshell and Peacock and Comma. All require stands of uncut Nettles in sunlight close to undergrowth where the Peacock and Small Tortoiseshell overwinter as pupa. Comma pupate on the Nettle itself. Low numbers of Nymphalids were in the High Garden and Barn garden and along the woodland edge of the new meadow.

#### 4.1.5 Thistles and Painted Lady

Thistles, *Cirsium Vulgare*, Artichoke, *Cynara scolymus* and Burdock, *Arctium* species are the larval food for Painted Lady. They emerge as adult butterfly in late summer around August and September so plants should be left uncut until at least late Autumn. 1 individual was seen in the Prairie nectaring high up on *Innula*.

#### 4.1.6 Violets and Fritillaries

Silver Washed Fritillary lay their eggs on trunks of Oak in close proximity to *Viola* species. The *Viola* is the only food of Silver Washed Fritillary. The woodland edge of the New Meadow had 2 specimens.

#### 4.1.7 Trefoils and Common Blues

The Common Blue lays her eggs on Birds Foot Trefoil, *Lornus corniculatus* and Black Medic, *Medicago lupulina*. They have a second brood which requires the presence of their food plant in late summer through the winter as the caterpillars feed up and then hibernate low down on the plant stems so do best with late cutting of meadows after September or uncut areas. A small population is present in all the meadow areas.

#### 4.1.8 Sorrels and Small Coppers

Female Small Coppers show a preference for Common Sorrel, *Rumex acetosa* and other *Rumex* species. The single specimen from a second brood this year corresponds with the national decline of this species although other survey areas show good numbers this year. Its food plant, Common Sorrel is not abundant at Dixter. It requires stems of its larval food plant on which to double brood and overwinter as a caterpillar.

#### 4.1.9 Dyers Greenweed and Green Hairstreak

Female Green Hairstreak show a preference for Dyer's Greenweed, *Genista tinctoria* but will utilise *Cystus scoparius*. Whilst other plants may be selected larval development is less successful, ([www.ukbutterflies.org](http://www.ukbutterflies.org) 20.07.18.) It pupates and needs leaf litter below its food plant in which to overwinter. Close cutting and removal of all hay and litter with exposure of bare earth may limit numbers to the single figures identified in the Orchard meadow.

#### 4.2 Species Presence in Relation to Nectar Sources

In the formal garden the Buddleia in the barn garden attracted the Large Whites, Peacock and Red Admiral predominantly. *Innula* in the Prairie, large White, and Painted Lady. *Origanum*, *Nepeta* and *Agastache* were fed upon predominantly by Small White, Green Vein White and Meadow Brown and Gate Keeper and Small Tortoiseshell. Whites and Small Tortoiseshell also fed on Primrose and Honesty. Common Blue were occasionally seen feeding on the shorter Daisy species such as *Rudbeckia*. Holly Blue were attracted to flowers in the hedges such as Holly, *Ilex aquifolium*, Hawthorn, *Crataegus monogyna* and Blackthorn, *Prunus spinosa*, but not to the garden flowers. Several species were only seen in the meadows even where the Long Border is in close proximity.

Species showing a preference for the meadow nectar resource were the Orange Tip which favoured its larval food flowers Cuckoo flower. Skippers, Green Hairstreak, Common Blue that nectared almost solely in the Meadows were observed on Knapweeds, *Centaurea nigra*, and Fleabanes, *Pulicaria dysenterica*, Bramble, *Rubus fruticosus* and Thistles, *Cirsium arvense*. Silver Washed Fritillary was only seen on Creeping Thistle.

These findings correlate with those noticed by Ratrieks F.(2016) whose work on the attractiveness of garden flowers to insects noted that both the flower

form and height above ground influence the abundance of butterfly species nectaring upon them.

## 5. Weights Wood Presence of Species in Relation to Habitat Resources

The survey dates were moved forward by 2 weeks to take account of the hot weather and 2017 survey data from West Sussex, ([www.UKBMS](http://www.UKBMS) 2017.) All three species within the survey were observed for the first time in Weights wood. Purple Emperor was a first recorded specimen for East Sussex.

### 5.1 Honeysuckle and White Admiral

25 White Admiral were counted in association with mature stands of *Lonicera periclymenum* along the main ride and feeding on their nectar plant the Bramble, *Rubus fruticosus*. Only Honeysuckle high in trees is used by the egg laying females in proximity with their nectar source, flowering brambles, was key to the excellent population of White Admirals in Weights Wood.

### 5.2 Goat Willow and Purple Emperor

A single male specimen was observed puddling in a pond bay in proximity with its larval food plant *Salix caprea* in a clearing surrounded by the male's territorial, mature Oak, *Quercus robur*. No females were identified but large numbers of White Admiral on the wing on the same day a female Emperor may have been missed. The availability of minerals in the form of carrion, muddy pools and animal faeces, is also key to the presence of Emperors.

### 5.3 Purple Hairstreak and Oak

Females lay eggs on *Quercus robur* and males patrol their tree top territory and sap runs. A newly hatched specimen was observed and a week later two were seen battling above the Oak at the entrance to Weights Wood.

## 6. Management Suggestions

### 6.1 Grassy areas

A rotation system of Grassy banks, drive edges and woodland edges and hedgerow bottoms should be left alternate years as standing grass to provide winter habitat for developing larva and chrysalis and late flowering native species planted in these areas such as the Melilots, *Melilotus alba* and Lucernes, *Medicago sativa* which flower into October.

## 6.2 Meadows

Stability of management is essential for butterfly population stability. However leaving even a small area of standing grass in each meadow, that remains uncut alternate years will greatly improve the chances of the meadow species to over winter (Price A.C. 2003) on the stems of their food plants or in the remaining grass tussocks. Also, current cutting times mean that later nectar sources such as Devil's Bit Scabious, *Succisa pratensis* and Betony, *Stachys officinalis* and Fleabane, *Pulicaria dysenterica*, are removed as they do not flower until after the meadow has been cut.

Actively planting and encouraging Common Sorrel, Dyers Greenweed and Birds Foot Trefoil and violet species in the meadows will provide larval food for Small Copper, Green Hairstreak and Common Blue and Silver Washed Fritillary and Pearl Bordered and Small Pearl Bordered Fritillary.

## 6.2 Woodland

Whilst opening rides and glades for grasses, violets and brambles, large stands of mature Honeysuckle growing in trees over 2m in height provide essential habitat for White Admiral so must be preserved. Goat Willow should be preserved and encouraged in glades around Oaks to encourage Purple Emperor and Purple Hairstreak. Alder Buckthorn should be planted to encourage Brimstone.

Connecting Weights Wood and Four Acre Shaw with the purchase of the new pasture and appropriate hedgerow management (see below) will help improve connectivity of habitat resources on the Estate.

## 6.3 Native Hedgerows

Cutting hedgerows annually has been one of the greatest causes of decline of butterfly species and population in the UK (Kirby 2001). Many of our rarest species need second year growth to succeed (Kirby 2001). Cutting hedge sides alternate years and leaving areas to mature into small trees and shrubs will provide habitat corridors for species and reduce isolation. Alder buckthorn should be planted for Brimstone and Blackthorn allowed to sucker for Brown Hairstreak. Violets and Cruciferae such as *Cardamine pratensis* should be actively planted and encouraged along hedgerow bottoms to provide continuity of supply of larval food. Banks of un-strimmed nettles in sunny areas will provide food for Red Admiral, Peacock and Small Tortoiseshell.

## 6.4 Formal Gardens

Providing “corridors” of Violets and Cardamine pratensis and other larval food plants along the formal hedge bottoms will increase the availability of larval food often overlooked by gardeners. Single flowered varieties of flower species in a range of heights will give the greatest diversity of access to nectar to the greatest number of butterfly species.

## 6.5 The Wider area

Proximity of the estate to the steam railway line and Eastern Rother river valley and surrounding gardens and countryside affords an opportunity for forming relationships to create a corridor of habitats extending away from Great Dixter into the rest of East Sussex.

## 7. Conclusion

The Great Dixter Estate’s diversity of habitats, long season of available nectar in the formal garden, constant water and mineral supply from muddy ponds and consistent wild meadow management for 100 years provides a potential larval and nectar feeding site for 26 of our British butterfly species.

As such Great Dixter can provide an educational model for improvements in biodiversity in gardens elsewhere. Locally Great Dixter provides a resource of breeding sites for 24 species. However isolation of the site from other breeding areas is a problem faced by many butterfly sites nationally, which may account for the absentee species and small populations of others. Slight changes in management and forming partnerships with neighbouring land owners offer great potential for Dixter to act as a hub from which to extend the breeding populations in East Sussex in future years.

## 8. Acknowledgements

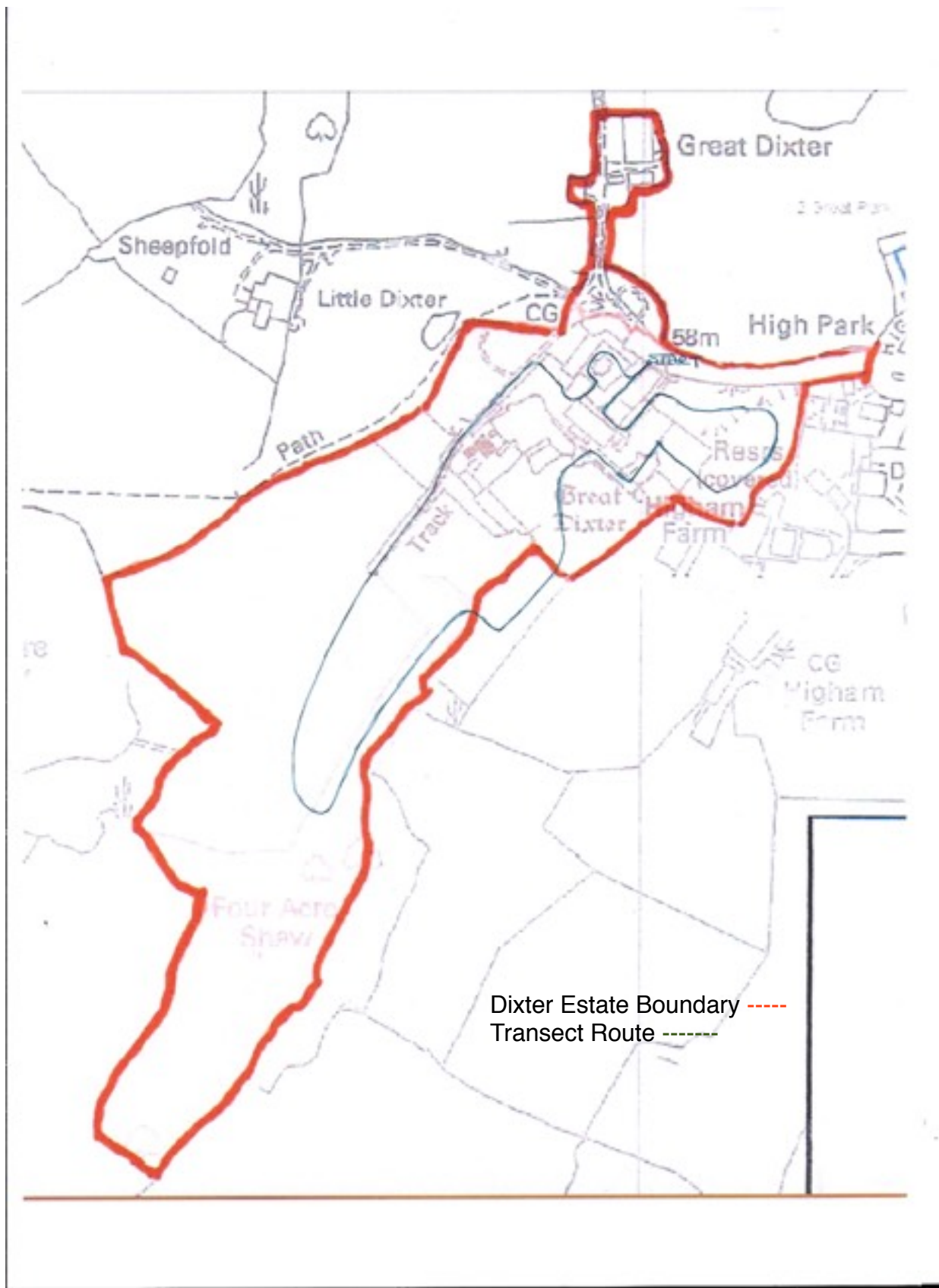
This survey has been made possible by funding from the National Heritage Lottery Fund and a generous donation from the Friends of Great Dixter and Butterfly Conservation providing guidance and number crunching. Without the dogged pursuing of a vision by Fergus Garret several years ago this project would not have been possible. My thanks to Sarah Seymore, Linda Jones, Graham Tippens and Victoria Williams, Ritch Asher and Andy Phillips for their personal support and encouragement.

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<a href="http://www.ukbms.org">www.ukbms.org</a> 20.07.18	UKBMS Annual Report 2016/17	

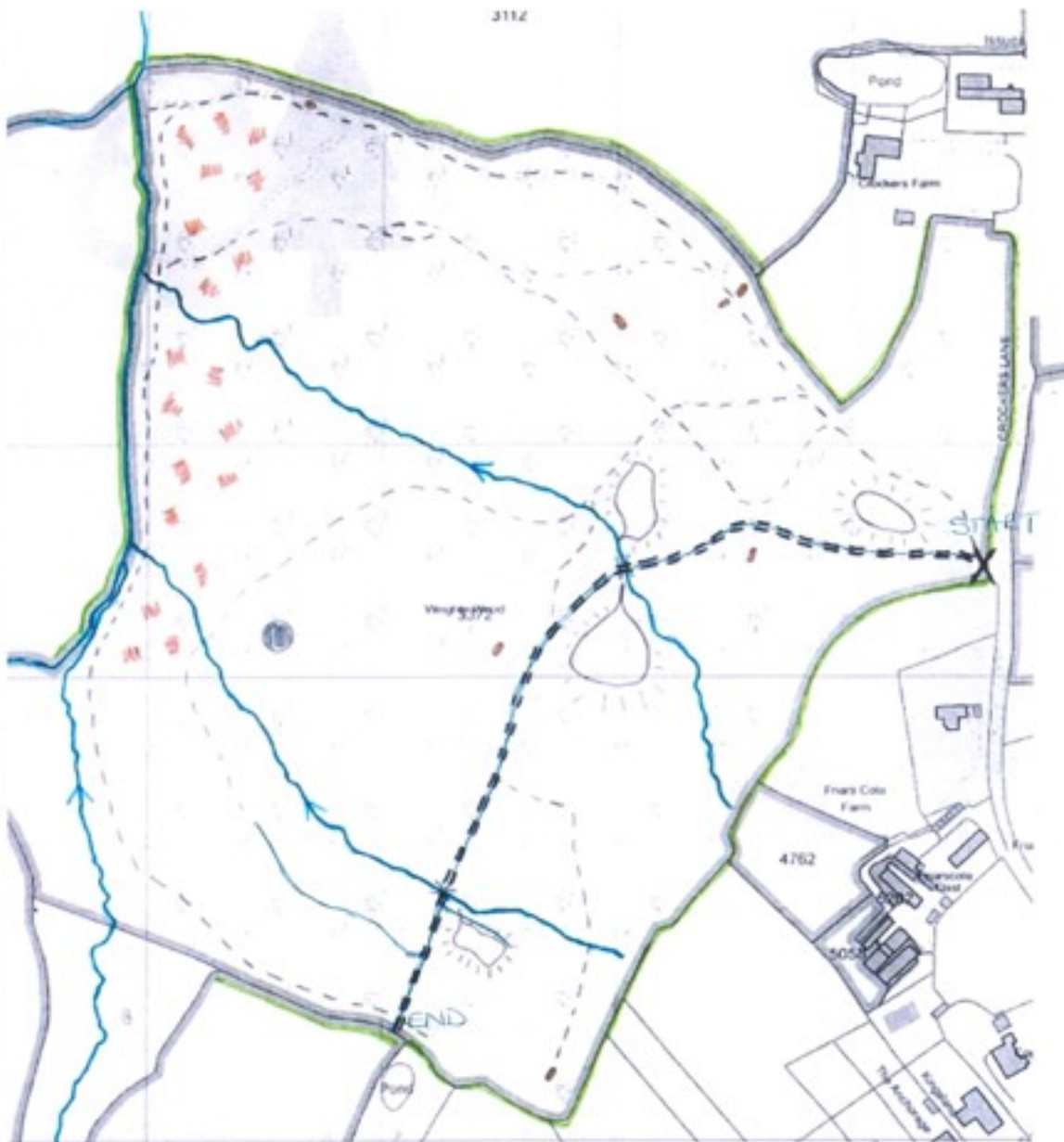
10. Appendices  
Appendix i Transect Route





# Appendix ii Weights Wood Survey Route

Weights Wood Boundary -----  
Survey Route X START====END



## Appendix iii

### Great Dixter Ecological Survey and Assessment 2007, Environmental Research & Advisory Partnership Preston, Lancashire

3.8.15 Weights Wood is located to the north of Great Dixter, the woodland covers an area of approximately 12 hectares. The woodland is situated on ground with a southern aspect. Towards the western side of the woodland is a small stream surrounded on both sides by more steeply sloping ground.

3.8.16 The most northern portion of woodland closest to 'Crocker's' has been cleared recently. The coppice management has resulted in an increased cover of grass species including Common Bent, Creeping Fescue and herbs including Foxglove (*Digitalis purpurea*) and Bluebell. The stumps and logs from the tree and shrub clearance remain on the woodland floor.

3.8.17 Further south the woodland is more semi-natural. The semi-mature to mature canopy supports abundant and constant Sweet Chestnut with Pedunculate Oak, Aspen (*Populus tremula*) and local Goat Willow.

3.8.18 Weights Wood has been used as a Hornbeam coppice and the majority of the remainder of the woodland is a dense cover of Hornbeam shrubs. Other shrubs include frequent Hawthorn and Honeysuckle with occasional Elder (*Sambucus nigra*) and Beech (*Fagus sylvatica*).

3.8.19 Wood Anemone is the most abundant woodland herb, in comparison with Woodland W1 where Bluebell has a greater percentage cover. The diverse herb layer also supports other ancient woodland herbs including Bugle (*Ajuga reptans*), Dog's Mercury, Wood Sedge (*Carex sylvatica*) Arum Lily, Wild Strawberry (*Fragaria vesca*), Early Purple Orchid, Primrose, Yellow Archangel, Lesser Stitchwort and Common Dog Violet.

3.8.20 As in Woodland 1, ferns are not frequent although Soft Shield Fern and Male Fern (*Dryopteris filix-mas*) occur only locally. The uneven woodland terrain has resulted in lower lying areas of ground with a greater moisture content. Such areas are colonised by Pendulous Sedge (*Carex pendula*) and Oppositeleaved Golden Saxifrage (*Chrysosplenium oppositifolium*).

3.8.21 Woodland 2 is regarded as an excellent representative of the W10b Pedunculate Oak-Bracken-Bramble, Wood Anemone sub-community of the NVC.

3.8.22 Where tracks extend through the woodland the more disturbed and compacted ground is colonised by herbs more tolerant of trampling including Annual Meadow grass, Greater Plantain, Creeping Buttercup and Creeping Bent to form the OV21 community of the NVC. Where vehicles have extended through areas of wetter

ground the waterlogged soil supports local areas of Opposite-leaved GoldenSaxifrage and Lesser Spearwort (*Ranunculus flammula*).

## Appendix iv

### Fixed Transect Table of Results by Section

Section Totals 2018	S1	S2	S3	S4	S5	S6	S7	S8	Grand Total
Brimstone		3							3
Clouded Yellow		1							1
Comma			5					1	6
Common Blue	9	8		14	10		5	3	49
Gatekeeper / Hedge Brown	2	3			21	5	5		36
Green Hairstreak				3					3
Green-veined White				6	4				10
Holly Blue		6			1			1	8
Large Skipper	1						13	6	20
Large White	5	3	11	1			2	12	34
Marbled White							1		1
Meadow Brown	5	13	4	6	13	3	55	12	111
Orange Tip		9	2		4				15
Peacock			4		3			4	11
Purple Hairstreak							2		2
Red Admiral	1		3		1	3	2	4	14
Ringlet							11		11
Small Copper		1					1		2
Small Skipper							13	1	14
Small Tortoiseshell			1						1
Small White	6	32	12					5	55
Small/Essex Skipper								2	2
Speckled Wood						6	2		8
Grand Total	29	79	42	30	57	17	112	51	

Appendix v.  
 2018 Fixed Transect Annual Summary by Week.

