

Tilbury Intertidal Zone: Terrestrial Invertebrate Survey Report 2024

February 2026

Natural England Commissioned Report **NECR624**

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Foreword

The Tilbury intertidal zone, between Coalhouse Fort and Tilbury Fort was surveyed in 2024 to determine its quality for terrestrial invertebrates and collect evidence to assess the case for notification as a Site of Special Scientific Interest (SSSI). The report does not itself make a case for notification, rather it provides an objective record of survey findings to support Natural England's independent assessment of special interest.

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Executive summary

This report details the results of a terrestrial invertebrate assessment of the intertidal zone between Coalhouse Fort and Tilbury Fort in Tilbury, south Essex. The purpose of the survey was to determine the contribution this area makes to the overall invertebrate assemblage represented by the North Thames Estuary and Marshes complex. The survey area was split into five compartments, and the work was carried out in 2024 based on two survey visits in July and a further two in September using active sampling methods only.

The survey produced a total of 389 species, 62 of which had a conservation status, including eight Section 41 Species of Principal Importance. Whole invertebrate assemblage analysis using Pantheon valued the importance of saltmarsh and short sward & bare ground habitats particularly highly. Four Specific Assemblage Types (SATs) were reported to be in favourable condition: 'Saltmarsh & Transitional Brackish Marsh' (M311), 'Rich Flower Resource' (F002), 'Bare Sand & Chalk' (F111) and 'Scrub Edge' (F001).

A key objective was also to assess the status and distribution of the Sea Aster Mining Bee *Colletes halophilus*, an important saltmarsh indicator species. This species was present in three of the survey compartments and while just a single nesting aggregation was located, suitable foraging areas were mapped in all five.

One survey compartment comprising a small area of saline seepage supported a strong population of the Nationally Rare ground bug *Henestaris halophilus*. This is a very local species confined to transitional saline habitats in southern England and has not previously been recorded from the North Thames Estuary.

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1 Introduction and Methodology

1.1 Background

- 1.1.1 On 15th February 2024 Colin Plant Associates (UK) was commissioned by Natural England to undertake a terrestrial invertebrate survey of the intertidal zone between Tilbury Fort and Coalhouse Fort on the north bank of the Thames estuary in South Essex.
- 1.1.2 This area is contiguous with the Mucking Flats & Marshes Site of Special Scientific Interest (SSSI). The purpose of the survey was to evaluate its importance for invertebrates and determine its contribution to the overall assemblage represented by the North Thames Estuary and Marshes complex.
- 1.1.3 A key objective of the survey was to assess the local abundance of the Nationally Scarce Sea Aster Mining Bee *Colletes halophilus* and its main forage resource Sea Aster *Aster tripolium*. This solitary bee is endemic to the southern North Sea region and is a well-known saltmarsh indicator species found on the southern and eastern coasts of England.
- 1.1.4 The survey area was divided into five compartments, which are summarised in Table 1. Survey compartments are displayed on maps in Figures 1, 2 and 3. In addition photographs of each survey area are displayed in Appendix 2.

Table 1: Details of the five survey areas

Name	Site centroid	Size/ha	Description
E1	TQ690765	2.00	A triangular parcel of open grassland directly south of Coalhouse Fort, comprising a mixture of tall sward, dry neutral grassland and stands of Sea Club Rush <i>Bolboschoenus maritimus</i> which are particularly evident towards the southern end. Cover by Sea Aster is confined to the margins of a semi-circular ditch which forms part of the eastern boundary.
F1	TQ661753	3.65	A long compartment comprising multiple parcels of open saltmarsh running from the mouth of Bill Meroy Creek and extending 1.4 km eastwards along the intertidal zone. Saltmarsh flora includes Common Cord-grass <i>Spartina anglica</i> , Sea Purslane <i>Atriplex portulacoides</i> , Sea Aster, Golden Samphire <i>Inula crithmoides</i> , Common Sea Lavender <i>Limonium vulgare</i> and Sea Beet <i>Beta vulgaris maritima</i> . A heat-stressed dry ruderal zone is intermittently present at the extreme landward edge and in several places,

Name	Site centroid	Size/ha	Description
			areas of exposed coastal sand and gravel are present.
F2	TQ68577608	0.03	A small seepage which has formed behind the sea wall west of F3 and occupies the extreme south-west corner of the adjacent arable field. The area is variably subject to saline incursion according to tidal conditions and the halophilic flora is dominated by Sea Purslane and Glasswort <i>Salicornia</i> .
F3	TQ689762	0.81	A wedge-shaped area of open saltmarsh south of E1 which is similar in character to F1 but rather more uniform in character and dominated by dense stands of Sea Purslane and Common Cord-grass. Some patchy coverage by Sea Aster is also present. At the northern end a low embankment formed by exposed gravels marks the edge of the upper saltmarsh zone.
TFM10	TQ646752	0.50	A small area of open saltmarsh between Tilbury Cruise Terminal and Tilbury Fort. Saltmarsh flora includes Common Cord-grass, Sea Purslane, Sea Aster, Golden Samphire and Sea Beet. A heat-stressed dry ruderal zone is present at the extreme landward edge. Areas of exposed coastal sand and gravels are evident towards the western end.



Figure 1: Location of survey compartments F2, F3, E1.



Figure 2: Location of survey compartment F1.

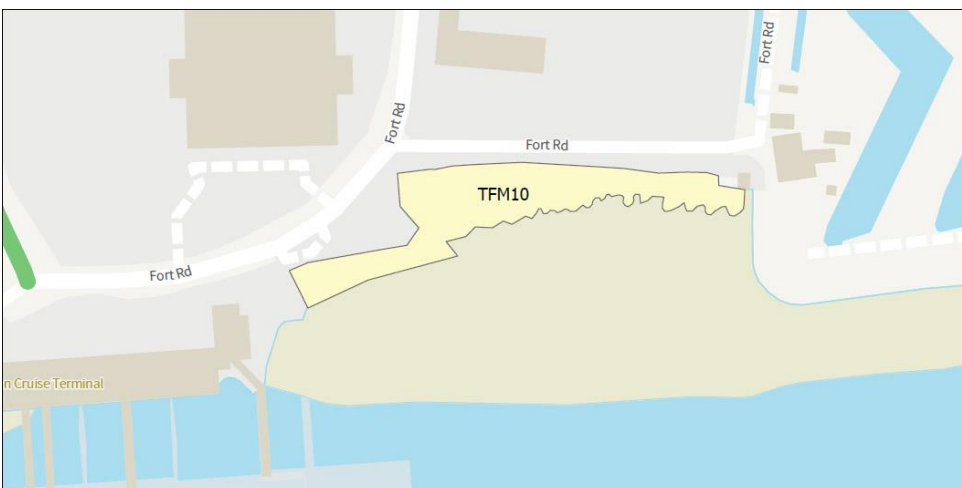


Figure 3: Location of survey compartment TFM10.

1.2 Methodology

- 1.2.1 Two invertebrate sampling visits were made on 4th July and 11th July to record intertidal species associated with the Specific Assemblage Type (SAT) M311 saltmarsh and transitional brackish marsh. This survey window was chosen by Natural England to maintain seasonal equivalence with the survey of the Mucking Flats & Marshes SSSI saltmarsh carried out in 2022.
- 1.2.2 Two further visits were made on 13th September and 14th September to obtain a detailed assessment of the presence of *Colletes halophilus* and to record other late season invertebrate taxa.
- 1.2.3 Sampling was undertaken by Marcel Ashby and Tristan Bantock, each with a different specialist area of invertebrate knowledge and experience. Invertebrate sampling was undertaken by direct observation or capture and by the following active sampling methods:

Sweep-netting. A stout hand-held net is moved vigorously through herbaceous vegetation or scrub to dislodge resting insects. This technique is effective for many invertebrates, including bees and wasps, flies, many groups of beetles and true bugs and large number of other insects that live in vegetation of this type.

Grubbing/hand searching. Important host plants may be searched by hand. This is particularly useful for species which live on or even below the ground surface and can be found by grubbing around and underneath basal leaf rosettes. Other invertebrate microhabitats such as wetland margins, loose bark, dung, litter, fungi and various decay features associated with dead wood can also be productive when searched by hand. Turning large stones, pieces of wood and other refuse often reveal species which are nocturnally active, in particular spiders, ground beetles and rove beetles.

Suction Sampling. A garden vacuum with a mesh bag fitted inside the inlet pipe is used to collect samples from low vegetation and the ground surface by suction. The sample is then everted into a large net bag or white trays for examination. The advantage of suction sampling is that it quickly collects ground dwelling species which do not fly or ascend the vegetation readily, as well as species which live in deep, structurally complex habitats such as dense grass tussocks and reed beds, which are difficult to sample by other methods. It is particularly productive for certain groups of beetles, true bugs and spiders.

- 1.2.4 The taxonomic scope of the survey is summarised in Table 2.

Table 2: Taxonomic coverage provided by the survey

Order / Higher Taxonomic Group	Common Name
Araneae	Spiders
Opilliones	Harvestmen
Neuroptera and allies	Lacewings, scorpion flies, snake flies and alder flies
Odonata	Dragonflies and damselflies
Orthoptera	Grasshoppers and crickets
Dermaptera	Earwigs
Dictyoptera	Cockroaches
Hemiptera-Auchenorrhyncha	Leafhoppers and allies
Hemiptera-Heteroptera	True bugs
Lepidoptera	Butterflies and moths
Trichoptera	Caddisflies
Coleoptera	Beetles
Diptera	Flies: All nine families within the larger Brachycera were identified systematically, as well as hoverflies (Syrphidae), snail-killing flies (Sciomyzidae), crane flies (Tipulidae, Ptychopteridae and Limoniidae), picture-winged flies (Tephritidae and Ulidiidae), Dolichopodidae and various other small families.
Hymenoptera-Symphyla	Sawflies
Hymenoptera-Aculeata	Bees, wasps and ants

1.3 Survey Constraints

1.3.1 No survey constraints were encountered.

2 Invertebrate Species

2.1 Summary

- 2.1.1 The survey produced a total of 389 species across the five survey compartments. This is presented in Appendix 1 and annotated with formal conservation status codes which are explained in Appendix 2.
- 2.1.2 The survey total is broken down by taxonomic grouping in Table 3. Coleoptera, Hymenoptera, Hemiptera and Diptera were the most highly represented species groups recorded by the survey.
- 2.1.3 The highest and lowest species totals were recorded in F1 and F3 respectively (Table 4). Over half of the species recorded by the survey were found in F1. This compartment also produced the highest proportion of unique species which were not found elsewhere (36%).

Table 3: Taxonomic breakdown of the 389 species recorded by the survey

Taxonomic Group	Number of Species	% of Total
insect - beetle (Coleoptera)	110	28
insect - hymenopteran	75	19
insect - true bug (Hemiptera)	70	18
insect - true fly (Diptera)	65	17
spider (Araneae)	26	7
insect - moth	10	3
insect - butterfly	14	4
insect - orthopteran	6	2
insect - dragonfly (Odonata)	4	1

Taxonomic Group	Number of Species	% of Total
insect - caddis fly (Trichoptera)	3	1
crustacean	3	1
harvestman (Opilliones)	2	1
insect - earwig (Dermaptera)	1	<1

Table 4: Species totals for each survey compartment

	E1	F1	F2	F3	TFM10
Species total	141	206	127	103	155
(%)	(36)	(53)	(33)	(26)	(40)
Unique species	43	75	31	17	45
(%)	(30)	(36)	(24)	(17)	(29)

2.2 Species of Conservation Interest

2.2.1 Several categories of invertebrates are of raised significance in an ecological assessment. These categories are explained in Appendix 2 and the corresponding species found during the survey are now examined.

UK Biodiversity Action Plan (UK BAP) Priority Species/Section 41 Species

2.2.2 UK BAP priority species were those identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). The original UK BAP list was created between 1995 and 1999 and stood at 577 species. Following a two-year review, a revised list was produced in 2007 which increased the number of BAP priority species to 1149. A total of 123 species no longer met the criteria for selection and were removed.

2.2.3 As a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK BAP is now focussed at a country level rather than a UK level, and the UK BAP has recently (July 2012) been succeeded by the *UK Post-2010 Biodiversity Framework*. The full list of priority invertebrate species can be viewed at:

[UK BAP List of UK Priority Species | JNCC Resource Hub](#)

2.2.4 The UK BAP list remains an important reference source and has been used to help draw up statutory lists of priorities in England, Scotland, Wales and Northern Ireland. For England and Wales these statutory lists are currently presented in *The Natural Environment & Rural Communities Act, 2006: Section 41. List of Species of Principal Importance for Conservation of Biological Diversity in England* and *Section 42: List of Species of Principal Importance for Conservation of Biological Diversity in Wales*.

2.2.5 Eight such Species of Principal Importance for Conservation of Biological Diversity in England (S41 species) were recorded during the present survey:

Saltmarsh Short-spur *Anisodactylus poeciloides* S41 NS is a ground beetle found very locally in coastal habitats in southern England between Dorset and East Suffolk. A recent IUCN status review published in 2016 reports presence from 16 hectads since 1980 and the species is very close to qualifying as Nationally Rare. Although historically regarded as a saltmarsh species, *A. poeciloides* seems to be more of a grassland and saltpan species which is rarely found in true saltmarshes and apparently avoids exposure to tidal conditions. It seems to use both areas of relatively open and saline terrain and denser adjacent vegetation where the soil may not be at all saline. These conditions may be found, for example, in the vicinity of a saline or brackish pool or borrowdyke that has gently sloping edges as these dry out. Its distribution within a site is likely to be limited to small patches of relatively open ground with early succession salt-associated plants (e.g. Glasswort *Salicornia*, Sea Aster *Aster tripolium*) that are surrounded by or adjacent to relatively dense grass or other vegetation.

***Ribautodelphax imitans* S41 RDBK** is a planthopper associated with dense tussocks of Tall Fescue *Festuca arundinacea* growing in dry grassland. Until very recently this species was regarded as extremely rare and was known only from four sites in southern England, with only two records from the last 35 years. However, in recent years it has been found to be locally common in some areas, with the Thames Gateway area of south Essex proving to be a stronghold.

Shrill Carder Bee *Bombus sylvarum* S41 NS(Nb) is a bumblebee found in warm and open flower-rich landscapes, including species-rich grassland, coastal grazing marsh, coastal dunes, vegetated shingle and post-industrial sites. The species was given national BAP status and remains a Species of Principal Importance on the basis of major declines across Britain due to agricultural intensification and it is now completely absent from

northern England and the Midlands. Parts of south Wales, Salisbury Plain, the Somerset Levels and the East Thames Corridor are now the major strongholds, supporting the most important metapopulations in the UK. Populations seem to operate at a landscape scale and in the East Thames Corridor this implies dependency upon the entire remaining network of post-industrial sites. The availability of suitable forage (nectar and pollen) sources throughout the whole season from May to September is crucial. The queens require nectar early in the season to replenish diminished energy resources following hibernation. They then need pollen for stocking cells in newly established nests to enable the first workers to develop. Workers require both nectar and pollen both for their own sustenance and to stock the developing nest. These resources need to be provided by an abundance of specific key plants all of which, significantly, have very long flowering seasons as well as long corolla tubes which correspond to the long tongues of the bumblebees. Important plant species used by queens include legumes such as vetches *Vicia*, clovers *Trifolium*, bird's-foot trefoils *Lotus*, as well as labiates such as dead-nettles *Lamium* and Black Horehound *Ballota nigra*. Workers are able to utilise a broader range of species. Observations suggest that a small number of large patches of flowers are used more frequently and are much more important than a larger number of small patches. Workers have a peculiar slow hovering flight between flowers, accompanied by a high-pitched (shrill) buzz.

Brown-banded Carder Bee *Bombus humilis* S41 is a bumblebee found in warm and open flower-rich landscapes, including chalk grassland, coastal dunes, vegetated shingle and post-industrial sites. The species was given national BAP status and remains a Species of Principal Importance on the basis of major declines across Britain due to agricultural intensification and it is absent from much of northern England and the Midlands. The coasts of south-west and south-east England, parts of south Wales, Salisbury Plain and the East Thames Corridor are now the major strongholds, supporting the most important metapopulations in the UK. Populations seem to operate at a landscape scale and in the East Thames Corridor this implies dependency upon the entire remaining network of post-industrial sites. The availability of suitable forage (nectar and pollen) sources throughout the whole season from May to September is crucial. The queens require nectar early in the season to replenish diminished energy resources following hibernation. They then need pollen for stocking cells in newly established nests to enable the first workers to develop. Workers require both nectar and pollen both for their own sustenance and to stock the developing nest. These resources need to be provided by an abundance of specific key plants all of which, significantly, have very long flowering seasons as well as long corolla tubes which correspond to the long tongues of the bumblebees. Important plant species used by queens include legumes such as vetches, clovers, bird's-foot trefoils, as well as labiates such as dead-nettles and Black Horehound. Workers are able to utilise a broader range of species. Observations suggest that a small number of large patches of flowers are used more frequently and are much more important than a larger number of small patches.

Sea Aster Bee *Colletes halophilus* NS(Na) S41 is an endemic bee of the southern part of the North Sea coasts, confined to the coasts of eastern and southern England between

Dorset and Yorkshire, south-west Germany, the Netherlands, Belgium and north-west France. Britain holds internationally important populations, the most important occurring in the Thames estuary and Essex coast. Females have a close association with flowers of Sea Aster *Aster tripolium*, from which they collect pollen to provision their nest cells, and the species has a late season coinciding with the flowering of its forage plant. It nests, often in large aggregations, on bare sandy soil and south-facing sunny slopes in upper saltmarsh or situations close by, including brownfield situations. However, the localities that support the largest populations are often where human intervention has extended the 'upper saltmarsh' habitat into more extensive areas on artificially produced substrates such as silt and pulverized fly ash (PFA) lagoons. It has probably been lost from many sites through coastal development and the loss of upper saltmarsh, whilst grazing of upper saltmarsh produces grass swards that contain little suitable forage.

Five-banded Weevil Wasp *Cerceris quinquefasciata* S41 RDB3 is a medium-sized yellow and black solitary wasp found in various open habitats on sandy soils and nesting in areas of bare sand in places exposed to the sun. Nests are often aggregated and tend to occur in relatively hard sandy soil, such as paths. The burrows are stocked with weevils, particularly *Apion* and *Sitona* species, but other prey may sometimes be taken, for example pollen beetles. It was included in the Natural England 'Species Recovery Programme' because of a decline thought to be due to the loss of open areas of sandy ground for nesting and flower-rich sandy grasslands for foraging. However, it now seems to be expanding its range, presumably in response to climate change and the main distribution covers the East Thames Corridor and the Breckland and coastal parts of East Anglia, as well as other scattered locations in the south and its true status is probably Nationally Scarce. This species is associated with sporadically disturbed land and the relatively unmanaged parts of heath edge or other sandy habitats. The distribution is probably partly climatic, but also reliant on an abundant prey supply associated with grasslands and scrub containing diverse flower-rich vegetation with areas of bare ground and uncut stems, seeds, flower heads and fruit heads that support the weevil prey species. Many sites where the wasp is currently known or from which it has recently been recorded are threatened or have already been lost to development, particularly post-industrial sites in the East Thames Corridor.

Wall *Lasiommata megera* S41 EN is a butterfly found in various habitats with a short and open grass sward including field edges, railway embankments, sand dunes and post-industrial sites, the larvae feeding on various grasses such as *Dactylis glomerata*, *Deschampsia flexuosa* and *Holcus lanatus*. Inland populations have experienced a severe and ongoing decline during recent decades, and the species is now primarily coastal and has been assigned an IUCN threat status of Endangered. It is a widespread species throughout England, Wales and southern Scotland, but very local in some parts of its range.

Small Heath *Coenonympha pamphilus* S41 VU is a butterfly found in various open habitats on dry, light soils, the larvae feeding on fine-leaved grasses such as *Festuca* species. Although widespread throughout Britain, the species has undergone a significant decline in recent decades due to the widespread loss and improvement of species-rich grassland and has now been assigned an International Union for Conservation of Nature (IUCN) threat status of Vulnerable. It was added to the UK Biodiversity Action Plan (BAP) list at the end of 2007, and although there were disagreements over the need for this action, it has been automatically included in the Section 41 lists of the Natural Environment and Rural Communities Act, 2006 (NERC Act). It appears to have declined more at inland sites than it has in coastal areas, though it remains present throughout at lower density than before. The presence of large numbers, indicating a thriving population, at an inland site is potentially more important than a similar discovery in a coastal locality, although that should not imply that coastal colonies are unimportant.



Figure 9: Two Section 41 species recorded by the survey: (Left) Brown-banded Carder Bee *Bombus humilis* and (right) Sea Aster Bee *Colletes halophilus* female © T. Bantock.

Nationally Rare / Red Data Book species

2.2.6 The following 17 species listed in the British Red Data Books (Shirt, 1987; Bratton, 1991) or which have been elevated to the status of Nationally Rare by subsequent formal reviews were recorded by the survey (see Appendix 2):

***Axinotarsus pulicarius* VU NR** is a malachite beetle found in open grasslands and ruderal situations, the larvae probably developing in the stems or at the roots of plants. The adults visit flowers. Although not reported at all for a long period through much of the twentieth century, it has been found in five hectads since 1980, all of which are concentrated in the Thames Gateway area.

***Dasytes virens* NT NR** is a soft-wing flower beetle found in various habitats including grasslands and woodland edges, usually in close proximity to ancient woodland. Adults feed on pollen and nectar and often visit flowers, especially

thistles, various umbels and blossom, and they may often be found on hawthorn in the spring. The larvae develop in dead wood where they predate the larval stages of other saproxylic insects. The species is very local and generally scarce in southeastern and central England and South Wales.

***Lixus scabricollis* RDBK** is a weevil associated with Sea Beet *Beta maritima* in various coastal habitats including vegetated shingle, sea walls and the upper zone of saltmarshes. It was first found in Kent in 1987 and has since spread west along the coast to Dorset, and is also known from south Wales, and north along the east coast as far as Suffolk.

***Coelositona cinerascens* RDBK** is a weevil associated with *Lotus* species growing in areas with saline influence, both on the coast and inland. For many years it was known as a British species from a single 19th century specimen only but was rediscovered in 2005 in Essex. It is now reportedly not uncommon on both the Essex and Kent sides of the Thames corridor where *Lotus tenuis* grows and it has also been found on this plant in East Sussex.

***Cosmobaris scolopacea* RDB3** is a small weevil which is confined to the upper zone of saltmarshes, the larvae feeding in the stem of Sea Purslane *Halimione portulacoides*. Apart from a single locality in Sussex and very recent records from Lincolnshire, this species is restricted to the saltmarshes of Kent and Essex and sometimes occurs in large numbers.

***Henestaris halophilus* RDB2** is a ground bug found beneath Sea Purslane *Atriplex portaculoides* in warm and sheltered areas of upper saltmarsh, often at the transition between saltmarsh and adjacent habitats which are infrequently inundated, or in areas of saline seepage. Populations are often small and colonies rather discrete in nature, but the bug is sometimes found in numbers. Nevertheless, it is often extremely local where it occurs and confined to small areas of vulnerable habitat. The species has been recently recorded from parts of West Norfolk, North and South Essex, East Kent and East Sussex.

***Nysius graminicola* RDB3** is a ground bug found in warm open ruderal habitats and grasslands, feeding on Asteraceae, including ragworts *Senecio* species and Common Fleabane *Pulicaria dysenterica*. It is often found with the common and very similar *Nysius senecionis* but is usually present in much smaller numbers. The exact distribution is unclear but is probably largely confined to southeast England, although the species no longer warrants Nationally Rare status.

***Lygus pratensis* RDB3** is a true bug which feeds on various species of Asteraceae. Although formerly extremely local and confined to lowland heathland in southern England, it has recently undergone a significant range expansion and is now widespread throughout much of southern Britain. It no longer warrants any conservation status.

***Myopites inulaedyssentericae* RDB3** is a picture-winged fly found in various open habitats, larvae developing in the flower head of Fleabane *Pulicaria dysenterica*. A local species largely confined to southern and central England, with most records from southern coastal counties, although there is evidence of a recent northward spread. Its current status is better considered Nationally Scarce.

***Myopites eximia* RDB3** is a picture-winged fly found in the upper zone of saltmarshes and saline banks where larvae develop in the flowerheads of Golden Samphire *Inula crithmoides*. The distribution is scattered along the coast of southern England from Dorset to Essex, with a stronghold in the Thames Estuary area and there are also records from parts of south Wales.

***Cistogaster globosa* RDB2** is a parasitic fly which is a larval parasitoid of the Bishop's Mitre *Aelia acuminata*, a widespread species of shieldbug. The host feeds on grasses, and most records of *C. globosa* are from dry grasslands. It is a local species in southern England and Wales but is now widespread and no longer warrants a conservation status.

Squat Furrow Bee *Lasioglossum pauperatum* RDB3 is a small solitary bee found in coastal grasslands, soft rock coastal cliffs and also inland on heathland and sandy habitats, nesting in light soils. This is a very local species which is confined to parts of southern England and has a major stronghold in the Thames Gateway areas of Essex and Kent but appears to have declined outside this region. Its true status is probably better described as Nationally Scarce.

Blue Carpenter Bee *Ceratina cyanea* RDB3 is a solitary bee found in various warm habitats, including chalk downland, heathland edge and post-industrial sites, nesting in dead hollow twigs and stems; typically, brambles close to the ground. Visits a very wide variety of flowers. Formerly considered a great rarity but now widespread in southeast England.

Orange-horned Nomad Bee *Nomada fulvicornis* RDB3 is a cuckoo bee associated with various *Andrena* species including *Andrena bimaculata* and *Andrena pilipes*. It occurs in various open habitats, typically on sandy soils. Local in southern England, with a scatter of records as far north as Yorkshire and around the coast of Wales. This species has presumably been assigned NR status on the basis of the subspecies *subcornuta*, which is sometimes treated as a full species and is a very rare inhabitant of central and southeast England where it is associated with *Andrena nigrospina*.

Bee Wolf *Philanthus triangulum* RDB2 is a solitary wasp found in various open habitats on sandy soils including lowland heath, acid grassland and coastal sand dunes, where it excavates nest burrows in the ground. These are provisioned with paralysed bees, mostly Honey Bee *Apis mellifera*, but wild species are also taken. Historically very rare and confined to three sites on the Isle of Wight, the species has undergone significant recent range expansion since the 1980s and is now

widespread throughout much of southern Britain as far north as Yorkshire. It no longer warrants a conservation status.

***Diodontus insidiosus* RDB3** is a small solitary wasp characteristic of warm, open sandy habitats such as heathland and acid grassland. Nest burrows are made in the ground which are provisioned with aphids. This species is largely confined to southern England between Dorset and Essex, and its status is probably better described as Nationally Scarce.

***Evagetes pectinipes* RDB1** is a spider-hunting wasp which is a cleptoparasite of other ground-dwelling pompilid species, laying its eggs in their nests. *Episyron rufipes* is the probable host of this species. For many years *E. pectinipes* was known only from the Deal/Sandwich area of Kent, but it has recently been recorded from a number of other sandy coastal sites including dunes, vegetated beaches, and sandy parts of shingle systems in Sussex, Kent, Essex, Suffolk and Norfolk. There are also a few inland records from sandy areas within the East Anglian Brecks.



Figure 10: Two Nationally Rare species recorded by the survey: (Left) the ground bug *Henestaris halophilus* and (right) the weevil *Lixus scabricollis* © T. Bantock

Nationally Scarce Species

2.2.7 The following 37 Nationally Scarce species were recorded by the survey (see Appendix 2).

***Synageles venator* NS** is a jumping spider which is distinctly ant-like and usually found associated with them. The species has been found in various habitats including sand dunes, fens and post-industrial sites including brick pits and pulverised fly ash fields. A very local species which is largely confined to coastal parts of southern England and south Wales, with scattered records further north.

***Sibianor aurocinctus* NS** is a jumping spider found in a variety of dry, sparsely vegetated habitats including grasslands, disused chalk or sand pits and other post-industrial sites. Most records are from south-east England where it has a major stronghold in the Thames Gateway area. Outside this region the species has a widely scattered and local distribution.

***Pardosa agrestis* NS** is a wolf spider found in a variety of open habitats on dry, sparsely vegetated substrates such as chalk pits, clay pits and other post-industrial sites. The species has a stronghold in southeast England with scattered records in the Midlands and on the coasts of Wales.

***Kochiura aulica* NS** is a small spider found on gorse, usually on heathland but also on coastal grassland and brownfield sites. It spins a small, tangled web among the spines at the ends of gorse branches. Local and confined to southern England.

***Bembidion normannum* NS** is a small ground beetle found in various coastal habitats, including tidal riverbanks, saltmarshes and the seashore. It is local around the coasts of England and Wales.

***Dicheirotichus obsoletus* NS** is a ground beetle found in litter in the upper saltmarsh zone, on seawalls and estuary banks. Locally distributed around the English coastline between Cornwall and Lincolnshire.

***Helophorus alternans* NS** is a water beetle confined to exposed lowland waters, most often in temporary or brackish pools on or near the coast, but also on heathland in southern England. A local species with a scattered distribution across southern Britain.

***Cercyon littoralis* NS** is a small water beetle associated with decaying seaweed in coastal habitats. It is widespread around much of the British coastline and probably does not warrant Nationally Scarce status.

***Cordicollis instabilis* NS** is a small ground dwelling beetle found in coastal habitats, particularly salt marshes and open sandy shores. Both adults and larvae are saprophagous and feed on decaying organic matter. A local species found on the coast of England between Dorset and Norfolk.

***Cyclodinus constrictus* NS** is a small ground dwelling beetle found in sandy habitats, particularly open sandy shores, saltmarshes and riverbanks. Both adults and larvae are saprophagous and feed on decaying organic matter. A local species found primarily on or near the coast of England between Cornwall and Norfolk.

***Meligethes rotundicollis* NS(Nb)** is a pollen beetle associated with various species of Brassicaceae, in particular, Field Mustard *Sinapis arvensis* and Hedge Mustard *Sisymbrium officinale*, larvae feeding on the flower buds. Widespread but local with a scattered distribution across England and Wales.

***Podagrica fuscipes* NS** is a leaf beetle found in various open habitats and associated with mallows (Malvaceae), adults feeding on the leaves. Although it can be common where it occurs, the distribution is largely confined to southeast England.

***Cassida nobilis* NS** is a leaf beetle found in various open habitats on chalky or sandy soils. Adults and larvae feed on leaves of Fat-hen *Chenopodium album*, oraches *Atriplex* and Corn Spurrey *Spergula arvensis*. Local in southern and central England and south Wales with a scatter of records further north and west.

***Hypera melancholica* NS(Nb)** is a weevil found on open sparsely vegetated ground, feeding on medicks *Medicago* and perhaps various other legumes. An uncommon and local species confined to parts of southern and eastern England.

***Pselactus spadix* NS(Nb)** is a wood-boring weevil found in coastal habitats, in particular estuaries, where it is associated with driftwood found in or just above the intertidal zone. A local species with a scattered distribution in England and Wales as far north as Yorkshire but may be common where it occurs.

***Sibinia arenariae* NS(Nb)** is a weevil found in saltmarshes and other coastal habitats, feeding on Sea-spurreys *Spergularia* species. Local in southern England and south Wales and sometimes found in abundance.

Adonis' Ladybird *Hippodamia variegata* NS(Nb) is a ladybird found in various disturbed, open habitats, feeding on aphids. Historically a coastal species, in recent years it has spread inland and is now widespread across southern and central England. It no longer warrants any conservation status.

***Haematopota grandis* NS** is a horse fly found in saltmarshes and brackish lagoons, the larvae are presumed to develop as predators in wet mud or decaying vegetation of brackish marsh. A local species confined to the southern coastlines of England and Wales north to Clwyd and Norfolk.

***Melieria picta* pNS** is a picture-winged fly found in saltmarshes and brackish ditches of coastal levels. The life history is unknown, but the larvae probably develop in decaying vegetable matter. Widespread but very local apart from in the Thames Estuary where it can be locally common.

***Dolichopus acuticornis* NS** is a dolichopodid fly recorded mainly from dune systems in Wales but also at scattered dunes and sandy rivers in England and Scotland, as well as saltmarsh associated with dune systems. Widespread but local throughout much of Britain.

***Dolichopus strigipes* NS** is a dolichopodid fly found in the upper zone of saltmarshes. This species has a localised coastal distribution in England between Dorset and South Yorkshire.

***Syntormon pseudospicatum* NS** is a dolichopodid fly which is widely considered synonymous with the much more common *S. pallipes* outside Britain and its presence on the British list is unclear. It is found in various coastal and inland wetlands including lagoons, saltmarshes and brackish pools and has a widespread but local distribution.

***Dioxyna bidentis* NS(Nb)** is a picture-winged fly whose larvae feed on the flower heads and unripe seeds of the Tripartite Bur-marigold *Bidens tripartita*, although it has been collected in areas where *Bidens* does not occur and may use other host plants. Habitat preferences are unclear, but records include marshes and wet areas on commons and dunes. Records are widely dispersed in England as far north as Yorkshire.

***Liorhyssus hyalinus* NS** is a true bug found in various open habitats, feeding on Stork's-bill *Erodium* and a range of composites. An irruptive species which was historically regarded as a rare vagrant to Britain, it has appeared much more frequently since the 1990s and become established in some areas, with a recent history of records from the coast of south Wales.

Slender-horned Leatherbug *Ceraleptus lividus* NS is a true bug which is strongly ground dwelling. A local and uncommon species found across southern and central England, favouring dry open habitats such as grasslands, sand dunes and gravel pits, feeding on clovers and other legumes.

***Pentastiridius leporinus* NS(Nb)** is a planthopper often associated with saltmarshes and distributed locally on or near the south coasts of England and Wales. The exact food plants are unclear but probably include *Phragmites* and Sea Club-rush *Bolboschoenus maritimus*, since colonies are usually found in the upper saltmarsh zone.

***Reptalus quinquecostatus* NS(Nb)** is a planthopper previously misidentified as *Reptalus panzeri*. The ecology of this species remains obscure, although it is often associated with grasslands in which the ground has a tendency to crack during the summer. Since the nymphs are root-feeders, this perhaps allows the adults to lay eggs below ground. Although restricted to southern England and designated as scarce, it is a fairly common species in southeast England and the London area.

Large Gorse Mining Bee *Andrena bimaculata* NS(Nb) is a ground-nesting solitary bee, found widely but locally across southern and central England on lowland heathland and in other habitats with sparsely vegetated sandy soils. The spring generation is often particularly associated with Gorse as a pollen source.

Sharp-collared Flower Bee *Lasioglossum malachurum* NS(Nb) is a solitary bee found in various habitats, including arable areas and urban greenspace, with a preference for clay soils. It nests in fairly bare soil and can form huge aggregations along paths and south-facing slopes. A wide variety of plants are used as pollen sources. Formerly scarce, it has expanded its range since 1990 and is now

widespread in southern and central England and no longer worthy of a conservation status.

Lobe-spurred Furrow Bee *Lasioglossum pauxillum* NS(Na) is a solitary bee recorded from a wide variety of situations in southern and central England including sandy heathland, calcareous grassland, coastal locations such as soft rock cliffs and other disturbed habitats. Nesting occurs in light soils. Formerly regarded as scarce, it now no longer warrants a conservation status.



Figure 11: Two Nationally Scarce species recorded by the survey: (Left) the Silvery Leafcutter Bee *Megachile leachella* and (Right) the weevil *Sibinia arenariae* © T. Bantock.

Ridge-cheeked Furrow Bee *Lasioglossum puncticolle* NS(Na) is a solitary bee found in various open habitats, preferring dry clay substrates and bare or sparsely vegetated soil in warm, sunny situations for nesting. Pollen sources include Wild Carrot, *Ranunculus*, *Cirsium* and several yellow composites. Local and largely confined to southern England, where it is particularly widespread in the Thames Gateway area.

Swollen-thighed Blood Bee *Sphecodes crassus* NS(Nb) is a cuckoo bee associated with various *Lasioglossum* species which is found in a range of dry open habitats. The species has become more frequent in recent years and is now widespread and locally common in southern and central England. Its formal status is in need of reassessment.

Pantaloon Bee *Dasypoda hirtipes* NS(Nb) is a mining bee occurring mainly in sandy habitats, especially heathland, sandpits and sand dunes. Nest burrows are dug in aggregations in bare areas including footpaths and pollen is collected mainly from yellow composites. Widespread in coastal areas of southern Britain between Norfolk and North Wales, but very local inland and in the west of its range.

Silvery Leafcutter Bee *Megachile leachella* NS(Nb) is a leafcutter bee favouring sandy coastal habitats including dunes and brownfield sites, nesting in the ground

and sometimes forming large aggregations. Widespread and locally common around the coastline of southern Britain from Lincolnshire to north Wales.

***Mimumesa unicolor* NS(Na)** is a solitary wasp which nests in the ground. Its precise ecology is unclear; it is known to nest in damp clay and may be associated with *Phragmites* areas. First recorded from undercliffs on the Isle of Wight, the wasp has since been found in South Hampshire, West Sussex and the East Thames Corridor which holds a nationally important metapopulation.

***Smicromyrme rufipes* NS(Nb)** is a small velvet ant which is strongly associated with hot sandy areas on heathland, coastal dunes and soft rock cliffs. The larvae are parasitoids of various ground nesting bees and wasps, the latter apparently including both crabronids and pompilids. A local species confined to heathland and coastal districts of southern England with records extending north to Norfolk.

Star-wort *Cucullia asteris* NS is a moth that is found locally in coastal habitats from Hampshire to Yorkshire, the larvae feeding on Sea Aster *Aster tripolium*. The species also occurs inland in parts of southern England and south Wales, where the larval host plant is Golden-rod *Solidago virgaurea* in woodlands.

2.2.8 A summary of all 62 species with a conservation status by survey compartment is presented in Table 5.

Table 5: Taxa with a conservation status and the compartments they were recorded in by the survey.

Species	Group	Conservation status	Compartment
<i>Anisodactylus poeciloides</i>	a ground beetle	S41, NS	F1; F2
<i>Ribautodelphax imitans</i>	a planthopper	S41, RDBK	E1; F3
<i>Bombus sylvarum</i>	a bumble bee	S41, NS(Nb)	E1; F1; F2; F3; TFM10
<i>Bombus humilis</i>	a bumble bee	S41	E1; F1; F2; F3; TFM10
<i>Colletes halophilus</i>	a solitary bee	S41, Na	F1; F3; TFM10

Species	Group	Conservation status	Compartment
<i>Cerceris quinquefasciata</i>	a solitary wasp	S41, RDB3	F1; TFM10
<i>Coenonympha pamphilus</i>	a butterfly	S41, VU	E1
<i>Lasiommata megera</i>	a butterfly	S41, EN	F1; F2; F3
<i>Axinotarsus pulicarius</i>	a malachite beetle	VU, NR	F1; TFM10
<i>Dasytes virens</i>	a beetle	NT, NR	F1
<i>Lixus scabricollis</i>	a weevil	RDBK	F1; TFM10
<i>Coelositona cinerascens</i>	a weevil	RDBK	E1
<i>Cosmobaris scolopacea</i>	a weevil	RDB3	F1; F2; F3; TFM10
<i>Henestaris halophilus</i>	a ground bug	RDB2	F2
<i>Nysius graminicola</i>	a ground bug	RDB3	E1; F1; F3; TFM10
<i>Lygus pratensis</i>	a plant bug	RDB3	E1; F1; F2; F3; TFM10
<i>Myopites eximius</i>	a picture-winged fly	RDB3	F1; F3; TFM10
<i>Myopites inulaedyssentericae</i>	a picture-winged fly	RDB3	TFM10
<i>Cistogaster globosa</i>	a parasitic fly	RDB2	E1; F1
<i>Ceratina cyanea</i>	a solitary bee	RDB3	F1; TFM10

Species	Group	Conservation status	Compartment
<i>Lasioglossum pauperatum</i>	a solitary bee	RDB3	F1; F3
<i>Nomada fulvicornis</i>	a solitary bee	RDB3	F1
<i>Evagetes pectinipes</i>	a spider-hunting wasp	RDB1	TFM10
<i>Philanthus triangulum</i>	a digger wasp	RDB2	F1
<i>Diodontus insidiosus</i>	a digger wasp	RDB3	F1
<i>Pardosa agrestis</i>	a spider	NS	F1
<i>Sibianor aurocinctus</i>	a spider	NS	F1; TFM10
<i>Synageles venator</i>	a spider	NS	F1
<i>Kochiura aulica</i>	a spider	NS	F1; TFM10
<i>Cordicollis instabilis</i>	a beetle	NS	F1; F2; TFM10
<i>Cyclodinus constrictus</i>	a beetle	NS	F1; F2; F3
<i>Meligethes rotundicollis</i>	a pollen beetle	NS(Nb)	TFM10
<i>Bembidion normannum</i>	a ground beetle	NS	F1; F2
<i>Dicheirotrichus obsoletus</i>	a ground beetle	NS	TFM10
<i>Cassida nobilis</i>	a leaf beetle	NS	F2
<i>Podagrica fuscipes</i>	a leaf beetle	NS	F1; TFM10
<i>Hippodamia variegata</i>	a ladybird	NS(Nb)	F1
<i>Hypera melancholica</i>	a weevil	NS(Nb)	F2

Species	Group	Conservation status	Compartment
<i>Pselactus spadix</i>	a weevil	NS(Nb)	F1; TFM10
<i>Sibinia arenariae</i>	a weevil	NS(Nb)	F2
<i>Helophorus alternans</i>	a water beetle	NS	E1; TFM10
<i>Cercyon littoralis</i>	a water beetle	NS	TFM10
<i>Dolichopus acuticornis</i>	a fly	NS	F1
<i>Dolichopus strigipes</i>	a fly	NS	E1; F1; F3
<i>Syntormon pseudospicatum</i>	a fly	NS	F1; F2; F3; TFM10
<i>Haematopota grandis</i>	a horse fly	NS	F2
<i>Melieria picta</i>	a fly	NS	E1; F1; F2; F3; TFM10
<i>Dioxya bidentis</i>	a picture-winged fly	NS(Nb)	F1
<i>Pentastiridius leporinus</i>	a planthopper	NS	E1; F1; F2; F3; TFM10
<i>Reptalus quinquecostatus</i>	a planthopper	NS(Nb)	E1; F2; F3
<i>Ceraleptus lividus</i>	a true bug	NS	E1
<i>Liorhyssus hyalinus</i>	a true bug	NS	TFM10
<i>Andrena bimaculata</i>	a solitary bee	NS(Nb)	F1
<i>Dasypoda hirtipes</i>	a solitary bee	NS(Nb)	F1

Species	Group	Conservation status	Compartment
<i>Lasioglossum malachurum</i>	a solitary bee	NS(Nb)	E1; F2; F3; TFM10
<i>Lasioglossum pauxillum</i>	a solitary bee	NS(Na)	F2
<i>Lasioglossum puncticolle</i>	a solitary bee	NS(Nb)	F1
<i>Megachile leachella</i>	a solitary bee	NS(Na)	F1
<i>Sphecodes crassus</i>	a solitary bee	NS(Na)	TFM10
<i>Mimumesa unicolor</i>	a solitary wasp	NS(Na)	F1
<i>Smicromyrme rufipes</i>	a velvet ant	NS(Nb)	TFM10
<i>Cucullia asteris</i>	a moth	NS	E1; F3

Table 6: Total taxa recorded in each compartment

	E1	F1	F2	F3	TFM10
Compartment total	17	40	20	18	29
(%)	(12)	(19)	(15)	(17)	(19)
Overall total			59		
(%)			(15)		

2.3 Assessment of the survey compartments

- 2.3.1 **Compartment E1** produced a total of 141 species and contained the lowest proportion of those with a conservation status (12%). Key species not found elsewhere comprised the Small Heath *Coenonympha pamphilus*, the weevil *Coelositona cinerascens* and the Slender-horned Leatherbug *Ceraleptus lividus*. Although this compartment is dominated by dry grassland, the more saline southern parts supported saltmarsh indicators including the beetle *Helophorus alternans*, the planthopper *Pentastiridius leporinus*, the flies *Dolichopus strigipes* and *Melieria picta* and the Star-wort *Cucullia asteris*.
- 2.3.2 **Compartment F1** produced the highest total of 206 species, as well as the highest proportion of unique species (36%) and the joint highest proportion of those with a conservation status (19%). This compartment supported a large fauna of aculeate Hymenoptera comprising 43 species, of which 21 were not found elsewhere. Probable nesting species included several which favour bare sandy substrates such as the Five-banded Weevil Wasp *Cerceris quinquefasciata*, the Silvery Leafcutter Bee *Megachile leachella*, the Pantaloon Bee *Dasygaster hirtipes* and the solitary wasp *Diodontus insidiosus*. The Coast Leafcutter Bee *Megachile maritima* was recorded in numbers, in addition to its cleptoparasite the Large Sharptail Bee *Coelioxys conoidea*. Other key species not found elsewhere included the Large Gorse Mining Bee *Andrena bimaculata* and its cuckoo the Orange-horned Nomad Bee *Nomada fulvicornis*, the dolichopodid fly *Dolichopus acutiformis*, the beetle *Dasytes virens* and the spiders *Pardosa agrestis* and *Synageles venator*.
- 2.3.3 **Compartment F2** produced a total of 127 species of which 15% had a conservation status and 24% were not found elsewhere. This compartment supported a very high level of interest given its extremely small size and rather vulnerable position at the seaward edge of a large arable field. Key species included the ground bug *Henestaris halophilus*, which was found in large numbers and at high density along the transition between saline and non-saline habitats. Approximately 15 individuals of the Saltmarsh Shortspur *Anisodactylus poeciloides* were also present and although this species was also recorded from F1, only a single individual was found here and this compartment is generally too open and exposed to inundation to support a large population of this ground beetle. Other important species not found elsewhere included the leaf beetle *Cassida nobilis*, the weevil *Sibinia arenariae* and the horse fly *Haematopota grandis*.
- 2.3.4 **Compartment F3** produced the lowest total of 103 species of which 17% had a conservation status and 17% were not found elsewhere. This low total was probably a consequence of the rather uniform nature of the habitat, which was heavily dominated by dense stands of Sea Purslane and Common Cord-grass. Despite this the compartment supported much of the saltmarsh invertebrate interest found elsewhere, including the ant beetle *Cyclodinus constrictus*, the weevil *Cosmobaris*

scolopacea, the dolichopodid fly *Dolichopus strigipes*, the picture-winged fly *Myopites eximius*, the planthopper *Pentastiridius leporinus* and the Star-wort *Cucullia asteris*.

2.3.5 **Compartment TFM10** produced a total of 155 species of which 19% had a conservation status and 28% were not found elsewhere. This compartment held a similar range of species to F1 comprising a range of saltmarsh indicators and species associated with exposed sand and dry ruderal swards, in particular aculeate Hymenoptera, but was not so species-rich, perhaps owing to its smaller size. Key species not found elsewhere included the spider-hunting wasp *Evagetes pectinipes*, the velvet ant *Smicromyrme rufipes*, the ground beetle *Dicheirotrichus obsoletus* and the water beetle *Cercyon littoralis*.

2.4 Status and distribution of the Sea Aster Mining Bee *Colletes halophilus*

2.4.1 The Sea Aster Mining Bee *Colletes halophilus* was recorded in F1, F3 and TFM10. Adults of both sexes were observed foraging at flowers of Sea Aster and an aggregation of several hundred nests was found in F3. This was located northeast of the Coalhouse Radar Tower at TQ68997626 and sited in a low gravel embankment at the edge of the upper saltmarsh zone.



Figure 12: Site of the *Colletes halophilus* nesting aggregation in compartment F3 © T. Bantock.

2.4.2 The approximate distribution of Sea Aster within the survey compartments and the presence / absence of the bee at these locations is summarised in Figures 13-15.

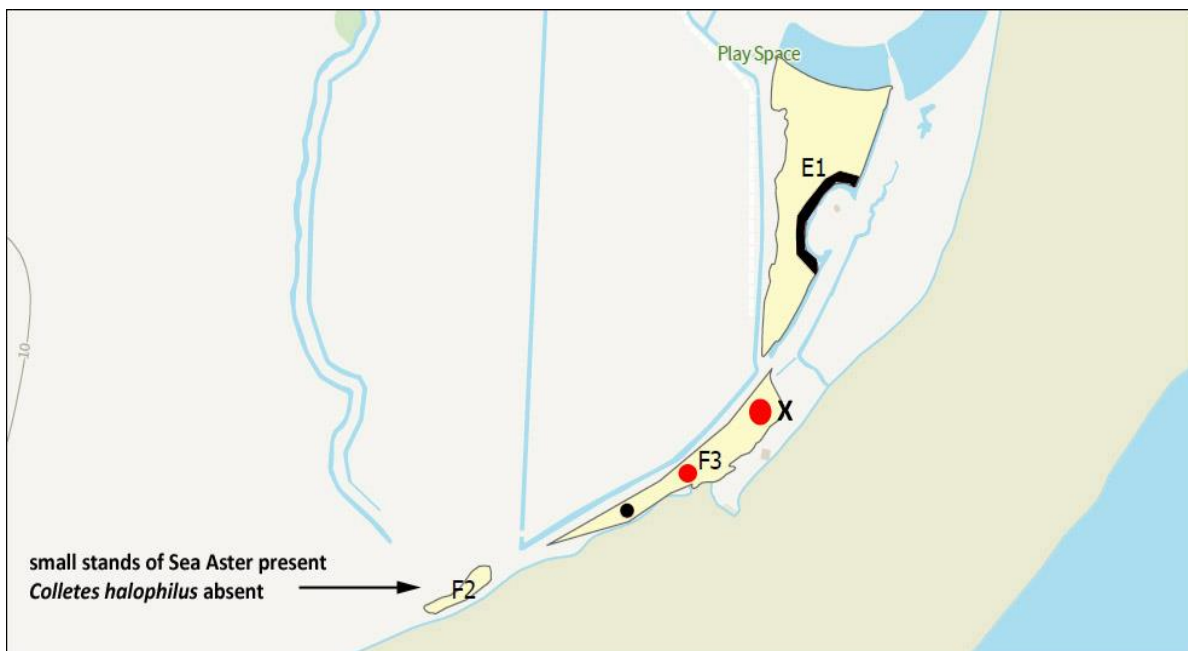


Figure 13: Compartments E1, F2 and F3: Shapes represent stands of Sea Aster with associated *Colletes halophilus* presence (red) or absence (black). X marks the location of a nesting aggregation.



Figure 14: Compartment F1: Shapes represent stands of Sea Aster with associated *Colletes halophilus* presence (red) or absence (black).



Figure 15: Compartment TFM10: Shapes represent stands of Sea Aster with associated *Colletes halophilus* presence (red) or absence (black).

2.5 The Overall Invertebrate Community

- 2.5.1 Rarity is only one factor to be taken into account in the assessment of the ecological value of a site. Some sites may have immensely diverse invertebrate assemblages but few rare species within these; they are of equal, if different, ecological value. It is therefore important to carry out a further assessment that also includes all remaining species.
- 2.5.2 We have undertaken this using Osiris, a habitat and resource association utility found within Pantheon, a database tool developed by Natural England and the Centre for Ecology and Hydrology and freely accessible online at [Pantheon Database Tool](#). This system has updated and replaced the Invertebrate Species-habitats Information System (ISIS) as of 2017. A major improvement of Pantheon has been the incorporation of current species conservation status designations, as many have changed since the original release of ISIS.
- 2.5.3 Pantheon interprets species lists by recognising assemblage types and scoring each type according to its conservation value. This information is used to assess the overall quality of the site, reveal its key ecological resources and ultimately inform decisions regarding habitat management and mitigation. In some cases, habitats that may have been overlooked or not considered important during the survey might be identified as significant.
- 2.5.4 To date around 12,000 species are included in the Pantheon database, around a quarter of the total macro-invertebrate fauna. It remains limited to those taxa and families where there is enough ecological information to give a fair level of coding

accuracy. These include species such as beetles, flies, true bugs, moths, bees and many others.

- 2.5.5 Invertebrate species are linked to habitats and resources in a large hierarchical database. The hierarchy is arranged with 'Broad biotopes' as the highest level. Each species can be typed to more than one habitat or resource category.
- 2.5.6 Each Broad biotope can be divided into more detailed 'Habitats' (previously known as 'Broad Assemblage Types' (BATs) in ISIS).
- 2.5.7 Each Habitat contains a set of 'Resources', defined by typing species to other environmental factors or microhabitats. Only those resources that are considered important to the completion of the life cycle of a species are included. Typing was not attempted for species that are either very catholic or where their ecology was not well defined in the literature.
- 2.5.8 Specific assemblage types' (SATs) are characterised by stenotopic (ecologically restricted) species that are of intrinsic nature conservation value. SATs are more narrowly defined than Habitats and each SAT is nested within a parent Habitat. *Note that the use of SATs is restricted to Natural England Common Standards Monitoring on SSSIs.*
- 2.5.9 Pantheon provides the following scoring systems for Broad biotopes, Habitats, Resources and SATs:
- A total count of species in each category.
 - The number of species represented in each category which have a conservation status. **Note that some statuses are reported in square brackets [], indicating that these are considered out of date and should be used with caution.**
 - The number of species belonging to each category as a percentage of the total number of species belonging to each category within the British invertebrate fauna.
 - A Species Quality Index (SQI) score for each category where more than 15 species are represented. Each species recorded from the sample is given a Species Quality Score (SQS) based on their conservation status. The SQI score is equal to the sum of all SQS scores divided by the number of species and then multiplied by 100 to give a 3-figure score that does not contain decimal places (e.g.100 rather than a 1.00). *Note that some SQI scores for species which have their status bracketed have been reduced to take account of this.* For example, the status of the plant bug *Lygus pratensis* is listed as [RDB3] and has a corresponding SQS of 1, since it is now widespread and common. For further information please see: [Pantheon Scoring Systems](#).

2.6 Pantheon output

- 2.6.1 Pantheon sample scores by Habitat are shown in Table 7. Of the 389 species recorded by the survey, 372 were represented in the Pantheon database,

corresponding to a return of 96%. The highest SQI score corresponded to saltmarsh (SQI=306), indicating that this habitat contained the greatest proportion of rare and scarce taxa overall. The percentage representation value was also high (10%), indicating that the 31 saltmarsh species recorded by the survey represented 10% of all British species typed to this habitat.

2.6.2 A high SQI score was also obtained for short sward & bare ground (SQI=170). This habitat type is well represented by areas of sparsely vegetated coastal sand and the barer parts of the upper saltmarsh ruderal zone in F1 and TFM10.

Table 7: Pantheon sample scores by Habitat (Habitats with <15 species have been omitted)

Broad biotope	Habitat	No. of species	% Representation	SQI	Species with conservation status	Conservation status
open habitats	tall sward & scrub	156	6	121	9	3 S41, 1 VU, 2 [RDB3], 2 NS, 1 [Nb]
open habitats	short sward & bare ground	93	7	170	23	3 S41, 1 RDB1, 1 [RDB2], 1 RDB3, 3 [RDB3], 4 NS, 1 [Na], 3 Nb, 6 [Nb]
coastal	saltmarsh	31	10	306	13	2 S41, 1 RDB2, 2 RDB3, 6 NS, 1 pNS, 1 Nb
wetland	marshland	26	3	122	2	1 NS, 1 Nb
wetland	acid & sedge peats	18	2	132	2	1 NS, 1 Nb

Table 8: ISIS Specific Assemblage Types (SATs) in favourable condition

SAT	No. of species	% representation	SQI	Species with conservation status	Conservation status	Reported condition
rich flower resource F002	34	14	224	12	3 S41, 3 [RDB3], 1 [Na], 1 Nb, 4 [Nb]	Favourable (34 of 15)
bare sand & chalk F111	24	5	246	10	1 S41, 1 RDB1, 1 RDB3, 1 [RDB3], 3 NS, 1 Nb, 2 [Nb]	Favourable (24 of 19)
saltmarsh & transitional brackish marsh M311	14	13	421	10	1 S41, 1 RDB2, 2 RDB3, 5 NS, 1 pNS	Favourable (14 of 9)
scrub edge F001	13	6	177	3	1 Nb	Favourable (13 of 11)

2.6.3 Most species recorded by the survey were associated with tall sward vegetation and scrub, although this habitat did not support a particularly raised interest. Scrub and woody vegetation are generally lacking across all the survey compartments; however tall swards are well represented by the grassland in E1 and by the ruderal zone present in F1 and TFM10.

2.6.4 Scores for the assemblage condition assessment based on ISIS SATs are shown in Table 8. A favourable reported condition was achieved for four SATs: rich flower resource, bare sand & chalk, saltmarsh & transitional brackish marsh and scrub edge. The rich flower resource SAT was particularly well represented, and 34 indicator species were recorded, more than double the number required to achieve favourable condition. No other SATs were close to qualifying as favourable.

3 Discussion

- 3.1.1 The intertidal areas surveyed between Tilbury Fort and Coalhouse Fort support a moderately large and diverse overall invertebrate assemblage. We regard the 389 recorded species to be a reasonably high total given that no passive sampling methods were employed, which continue to operate in the absence of a surveyor.
- 3.1.2 The fauna is of very high quality, including eight Section 41 species and 54 species which are Nationally Rare or Nationally Scarce. A simple overall benchmark for any survey is the proportion of the recorded fauna composed of species with Nationally Rare or Nationally Scarce status. Sites where this exceeds 10% indicate exceptional quality. The overall figure for the areas surveyed here stands at almost 16%, suggesting that they may qualify as nationally important when considered as a single unit.
- 3.1.3 The Pantheon analysis indicates that the saltmarsh and transitional brackish marsh fauna is of very high importance. This wide ranging SAT occupies a range of different zones from mid saltmarsh through upper saltmarsh to various transitional habitats. These zones are well-represented by the open areas of tidal saltmarsh in F1, F3 and TFM10, although F3 supports a lower overall invertebrate interest.
- 3.1.4 However, this assemblage type also includes areas that are only inundated by spring tides or storm surges, in addition to saline seepages and salt pans which experience greatly reduced levels of tidal disturbance in comparison to open saltmarsh. Such areas are represented by the saline seepage found in F2. This compartment supports two important species characteristic of transitional saline habitats: the Section 41 ground beetle *Anisodactylus poeciloides* and the Nationally Rare ground bug *Henestaris halophilus*, which forms a particularly strong population here. As far as we are aware, these are the first records of *H. halophilus* from the North Thames Estuary and the species has an extremely localised and sporadic distribution in Essex (Essex Field Club, 2024). F2 must be regarded as a highly vulnerable area of habitat given its very small size, location at the extreme edge of an arable field and superficially unremarkable nature.
- 3.1.5 A caveat relating to the interpretation of Pantheon SQI scores assigned to saltmarsh is worth stating here. It should be borne in mind that this habitat contains numerous specialised ecological niches that are more likely to be occupied by rare and scarce taxa and therefore always tend to produce higher SQI scores. It is not unusual for saltmarsh sites in south-east England to score in excess of 300 (Colin Plant Associates, 2022).
- 3.1.6 The Pantheon analysis indicates that the rich flower resource assemblage is in particularly favourable condition. This is a cross-cutting assemblage found in many habitats and all species coded to this SAT are aculeates, in particular flower-visiting bees. Compartments F1 and TFM10 support a high level of invertebrate interest associated with areas of short sward grassland and bare ground, many of which are aculeate Hymenoptera. It is clear that these species are using these compartments both as nesting and feeding areas and the dry ruderal flower-rich edges are an important foraging resource.

- 3.1.7 The bare sand & chalk assemblage contains species that are associated with hot, dry soil conditions found in bare ground in early successional habitats, often on nutrient-poor and freely-draining soils. This SAT is also most strongly expressed in compartments F1 and TFM10 and includes various ground-dwelling spiders, ground beetles and true bugs amongst its species of conservation importance, as well as a suite of aculeates associated with exposed sand.
- 3.1.8 The work presented here has confirmed the presence of the Sea Aster Mining Bee *Colletes halophilus* in F1, F3 and TFM10. Although all of these survey compartments are important foraging areas for this species, F3 is the only area which holds a large nesting aggregation.

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Appendices

Appendix 1 – Table 9 – Recorded invertebrate species

Cells left blank where there is no conservation status (IUCN or GB rarity) for the species. Cells also left blank where compartments did not have a particular species recorded. In addition, some cells are left blank where a species does not have a vernacular name.

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
ISOPODA	Armadillidiidae	<i>Armadillidium vulgare</i>	Common Pill Woodlouse	L C			X			X
ISOPODA	Ligiidae	<i>Ligia oceanica</i>	Sea Slater	L C					X	
ISOPODA	Philosciidae	<i>Philoscia muscorum</i>	Common Striped Woodlouse	L C			X	X		X
ARANEAE	Araneidae	<i>Araneus diadematus</i>	Garden Spider	L C			X			X
ARANEAE	Araneidae	<i>Araneus quadratus</i>		L C		X				

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
ARANEAE	Araneidae	<i>Argiope bruennichi</i>		L C			X			
ARANEAE	Araneidae	<i>Larinioides cornutus</i>		L C		X				
ARANEAE	Araneidae	<i>Mangora acalypha</i>		L C		X	X			
ARANEAE	Araneidae	<i>Neoscona adianta</i>		L C		X	X	X	X	
ARANEAE	Araneidae	<i>Nuctenea umbratica</i>		L C						X
ARANEAE	Clubionidae	<i>Clubiona stagnatilis</i>		N E					X	
ARANEAE	Dictynidae	<i>Brigittea latens</i>		L C		X		X	X	
ARANEAE	Dictynidae	<i>Dictyna arundinacea</i>		L C		X	X		X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
ARANEAE	Dysderidae	<i>Dysdera crocata</i>		L C						X
ARANEAE	Gnaphosidae	<i>Drassodes cupreus</i>		L C			X			
ARANEAE	Gnaphosidae	<i>Zelotes apricorum</i>		L C			X			
ARANEAE	Linyphiidae	<i>Linyphia hortensis</i>		L C						X
ARANEAE	Linyphiidae	<i>Tenuiphantes tenuis</i>		L C		X			X	
ARANEAE	Lycosidae	<i>Arctosa leopardus</i>		L C			X			
ARANEAE	Lycosidae	<i>Pardosa agrestis</i>		L C	NS		X			
ARANEAE	Philodromidae	<i>Philodromus cespitum</i>		L C		X	X	X	X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
ARANEAE	Philodromidae	<i>Tibellus oblongus</i>		L C		X		X		
ARANEAE	Pisauridae	<i>Pisaura mirabilis</i>		L C		X	X	X	X	X
ARANEAE	Salticidae	<i>Heliophanus flavipes</i>		L C			X	X		
ARANEAE	Salticidae	<i>Salticus scenicus</i>		L C			X			
ARANEAE	Salticidae	<i>Sibianor aurocinctus</i>		L C	NS		X			X
ARANEAE	Salticidae	<i>Synageles venator</i>		L C	NS		X			
ARANEAE	Tetragnathidae	<i>Tetragnatha extensa</i>		L C		X		X		
ARANEAE	Theridiidae	<i>Kochiura aulica</i>		L C	NS		X			X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
OPILLIONES	Phalangiidae	<i>Opilio parietinus</i>		N E						X
OPILLIONES	Phalangiidae	<i>Phalangium opilio</i>		N E			X	X		X
COLEOPTERA	Anthicidae	<i>Anthicus antherinus</i>		L C		X		X	X	
COLEOPTERA	Anthicidae	<i>Cordicollis instabilis</i>		L C	NS		X	X		X
COLEOPTERA	Anthicidae	<i>Cyclodinus constrictus</i>		L C	NS		X	X	X	
COLEOPTERA	Apionidae	<i>Aspidapion aeneum</i>		N E			X	X		X
COLEOPTERA	Apionidae	<i>Aspidapion radiolus</i>		N E			X			X
COLEOPTERA	Apionidae	<i>Ceratapion carduorum</i>		N E		X				

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Apionidae	<i>Ceratapion onopordi</i>		N E		X	X			
COLEOPTERA	Apionidae	<i>Eutrichapion vorax</i>		N E		X				
COLEOPTERA	Apionidae	<i>Malvapion malvae</i>		N E			X			X
COLEOPTERA	Apionidae	<i>Perapion hydrolapathi</i>		N E		X				
COLEOPTERA	Apionidae	<i>Pseudapion rufirostre</i>		N E			X			X
COLEOPTERA	Cantharidae	<i>Cantharis flavilabris</i>		L C		X			X	
COLEOPTERA	Cantharidae	<i>Cantharis lateralis</i>		L C		X	X			
COLEOPTERA	Cantharidae	<i>Rhagonycha fulva</i>		L C		X	X	X	X	X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Carabidae	<i>Anisodactylus poeciloides</i>		L C	NS, S41		X	X		
COLEOPTERA	Carabidae	<i>Bembidion lunulatum</i>		L C			X	X		
COLEOPTERA	Carabidae	<i>Bembidion minimum</i>		L C			X	X		X
COLEOPTERA	Carabidae	<i>Bembidion normannum</i>		L C	NS		X	X		
COLEOPTERA	Carabidae	<i>Bembidion varium</i>		L C			X	X		
COLEOPTERA	Carabidae	<i>Curtonotus convexiusculus</i>		L C				X		
COLEOPTERA	Carabidae	<i>Dicheirotichus obsoletus</i>		L C	NS					X
COLEOPTERA	Carabidae	<i>Harpalus rufipes</i>		L C				X		

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Carabidae	<i>Microlestes maurus</i>		L C			X			
COLEOPTERA	Carabidae	<i>Microlestes minutulus</i>		L C			X			X
COLEOPTERA	Carabidae	<i>Notiophilus substriatus</i>		L C			X			
COLEOPTERA	Carabidae	<i>Ophonus ardosiacus</i>		L C			X			
COLEOPTERA	Carabidae	<i>Paradromius linearis</i>		L C		X			X	
COLEOPTERA	Carabidae	<i>Philorhizus notatus</i>		L C						X
COLEOPTERA	Carabidae	<i>Pogonus chalceus</i>		L C			X	X		
COLEOPTERA	Carabidae	<i>Pterostichus madidus</i>		L C			X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Carabidae	<i>Trechus quadristriatus</i>		L C						X
COLEOPTERA	Chrysomelida e	<i>Aphthona euphorbiae</i>		L C		X			X	X
COLEOPTERA	Chrysomelida e	<i>Bruchidius imbricornis</i>		N A		X	X			X
COLEOPTERA	Chrysomelida e	<i>Bruchus loti</i>		L C					X	
COLEOPTERA	Chrysomelida e	<i>Cassida nobilis</i>		L C	NS			X		
COLEOPTERA	Chrysomelida e	<i>Cassida vittata</i>		L C			X			
COLEOPTERA	Chrysomelida e	<i>Cryptocephalus fulvus</i>		L C			X			
COLEOPTERA	Chrysomelida e	<i>Longitarsus dorsalis</i>		L C		X				

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Chrysomelidae	<i>Longitarsus melanocephalus</i>		L C		X				
COLEOPTERA	Chrysomelidae	<i>Longitarsus parvulus</i>		L C				X		
COLEOPTERA	Chrysomelidae	<i>Longitarsus pellucidus</i>		L C						X
COLEOPTERA	Chrysomelidae	<i>Phaedon armoraciae</i>		L C			X			X
COLEOPTERA	Chrysomelidae	<i>Phaedon tumidulus</i>		L C		X				
COLEOPTERA	Chrysomelidae	<i>Phyllotreta atra</i>		L C		X	X			
COLEOPTERA	Chrysomelidae	<i>Phyllotreta nigripes</i>		L C		X				
COLEOPTERA	Chrysomelidae	<i>Phyllotreta undulata</i>		L C		X			X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Chrysomelidae	<i>Podagrica fuscipes</i>		LC	NS		X			X
COLEOPTERA	Chrysomelidae	<i>Psylliodes affinis</i>		LC		X				
COLEOPTERA	Chrysomelidae	<i>Psylliodes chrysocephala</i>		LC		X	X	X	X	X
COLEOPTERA	Coccinellidae	<i>Adalia decempunctata</i>		NE		X				
COLEOPTERA	Coccinellidae	<i>Coccidula rufa</i>		NE				X	X	
COLEOPTERA	Coccinellidae	<i>Coccinella septempunctata</i>	7-spot Ladybird	NE			X		X	X
COLEOPTERA	Coccinellidae	<i>Harmonia axyridis</i>	Harlequin Ladybird	NE			X			
COLEOPTERA	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' ladybird	NE	NS(Nb)		X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Coccinellidae	<i>Propylea 14-punctata</i>	14-spot Ladybird	N E		X	X		X	X
COLEOPTERA	Coccinellidae	<i>Psyllobora 22-punctata</i>	22-spot Ladybird	N E		X		X	X	X
COLEOPTERA	Coccinellidae	<i>Rhyzobius litura</i>		N E		X				X
COLEOPTERA	Coccinellidae	<i>Scymnus haemorrhoidalis</i>		N E					X	
COLEOPTERA	Coccinellidae	<i>Subcoccinella 24-punctata</i>	24-spot Ladybird	N E		X		X		
COLEOPTERA	Coccinellidae	<i>Tytthaspis sedecimpunctata</i>	16-spot Ladybird	N E				X	X	
COLEOPTERA	Cryptophagidae	<i>Ephistemus globulus</i>		N E				X		
COLEOPTERA	Curculionidae	<i>Anthonomus rubi</i>	Strawberry Blossom Weevil	N E						X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Curculionidae	<i>Ceutorhynchus obstrictus</i>		N E					X	
COLEOPTERA	Curculionidae	<i>Coelositona cinerascens</i>		N E	RDBK	X				
COLEOPTERA	Curculionidae	<i>Cosmobaris scolopacea</i>		N E	RDB3		X	X	X	X
COLEOPTERA	Curculionidae	<i>Glocianus distinctus</i>		N E		X				
COLEOPTERA	Curculionidae	<i>Hypera melancholica</i>		N E	NS(Nb)			X		
COLEOPTERA	Curculionidae	<i>Lixus scabricollis</i>		N E	RDBK		X			X
COLEOPTERA	Curculionidae	<i>Mecinus pascuorum</i>		N E			X			
COLEOPTERA	Curculionidae	<i>Pselectus spadix</i>		N E	NS(Nb)		X			X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Curculionidae	<i>Sibinia arenariae</i>		NE	NS(Nb)			X		
COLEOPTERA	Curculionidae	<i>Sitona hispidulus</i>		NE		X	X	X		X
COLEOPTERA	Curculionidae	<i>Sitona humeralis</i>		NE			X			X
COLEOPTERA	Curculionidae	<i>Sitona obsoletus</i>		NE					X	
COLEOPTERA	Curculionidae	<i>Sitona lineatus</i>		NE		X			X	
COLEOPTERA	Curculionidae	<i>Trichosirocalus troglodytes</i>		NE		X				
COLEOPTERA	Helophoridae	<i>Helophorus alternans</i>		LC	NS	X				X
COLEOPTERA	Hydrophilidae	<i>Cercyon littoralis</i>		LC	NS					X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Latridiidae	<i>Corticaria impressa</i>		N E						X
COLEOPTERA	Latridiidae	<i>Melanophthalma suturalis</i>		N E				X		
COLEOPTERA	Melyridae	<i>Axinotarsus pulicarius</i>		V U	NR		X			X
COLEOPTERA	Melyridae	<i>Cordylepherus viridis</i>		L C		X	X	X	X	X
COLEOPTERA	Melyridae	<i>Dasytes virens</i>		N T	NR		X			
COLEOPTERA	Mordellidae	<i>Mordellistena pumila</i>		L C		X	X			
COLEOPTERA	Nitidulidae	<i>Meligethes aeneus</i>	Common Pollen Beetle	N E		X	X		X	
COLEOPTERA	Nitidulidae	<i>Meligethes rotundicollis</i>		N E	NS(Nb)					X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Oedemeridae	<i>Oedemera lurida</i>		L C		X	X	X		X
COLEOPTERA	Oedemeridae	<i>Oedemera nobilis</i>	Swollen-thighed Beetle	L C		X	X	X		X
COLEOPTERA	Phalacridae	<i>Olibrus affinis</i>		L C			X	X	X	X
COLEOPTERA	Phalacridae	<i>Olibrus flavicornis</i>		L C		X	X	X		
COLEOPTERA	Phalacridae	<i>Phalacrus championi</i>		L C					X	
COLEOPTERA	Phalacridae	<i>Phalacrus fimetarius</i>		L C				X		
COLEOPTERA	Scraptiidae	<i>Anaspis fasciata</i>		L C		X				X
COLEOPTERA	Scraptiidae	<i>Anaspis garneysi</i>		L C			X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Silphidae	<i>Phosphuga atrata</i>		L C			X			
COLEOPTERA	Staphylinidae	<i>Achenium depressum</i>		L C				X		
COLEOPTERA	Staphylinidae	<i>Aleochara bipustulata</i>		N E					X	
COLEOPTERA	Staphylinidae	<i>Brachygluta helferi</i>		N E				X		X
COLEOPTERA	Staphylinidae	<i>Drusilla canaliculata</i>		N E			X			
COLEOPTERA	Staphylinidae	<i>Megalinus glabratus</i>		L C			X			
COLEOPTERA	Staphylinidae	<i>Ocypus olens</i>		L C			X			
COLEOPTERA	Staphylinidae	<i>Othius laeviusculus</i>		L C			X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
COLEOPTERA	Staphylinidae	<i>Paederus littoralis</i>		L C				X		
COLEOPTERA	Staphylinidae	<i>Quedius nemoralis</i>		L C						X
COLEOPTERA	Staphylinidae	<i>Sepedophilus marshami</i>		N E			X			
COLEOPTERA	Staphylinidae	<i>Stenus ossium</i>		N E		X				
COLEOPTERA	Staphylinidae	<i>Sunius propinquus</i>		L C			X			
COLEOPTERA	Staphylinidae	<i>Tachyporus hypnorum</i>		L C			X			
COLEOPTERA	Staphylinidae	<i>Tasgius ater</i>		L C			X	X		
COLEOPTERA	Throscidae	<i>Trixagus obtusus</i>		N E				X		

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DERMAPTERA	Forficulidae	<i>Forficula auricularia</i>	Common Earwig	L C		X	X	X		
DIPTERA	Asilidae	<i>Dioctria baumhaueri</i>		L C						X
DIPTERA	Asilidae	<i>Leptogaster cylindrica</i>		L C		X	X	X	X	X
DIPTERA	Calliphoridae	<i>Calliphora vicina</i>		N E			X			
DIPTERA	Conopidae	<i>Physocephala rufipes</i>		N E		X				
DIPTERA	Conopidae	<i>Thecophora atra</i>		N E		X				
DIPTERA	Dolichopodidae	<i>Chrysotus blepharosceles</i>		N E				X		
DIPTERA	Dolichopodidae	<i>Dolichopus acuticornis</i>		L C	NS		X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Dolichopodidae	<i>Dolichopus festivus</i>		NE		X				
DIPTERA	Dolichopodidae	<i>Dolichopus griseipennis</i>		NE		X		X	X	X
DIPTERA	Dolichopodidae	<i>Dolichopus nubilus</i>		NE				X		
DIPTERA	Dolichopodidae	<i>Dolichopus strigipes</i>		LC	NS	X	X		X	
DIPTERA	Dolicopodidae	<i>Machaerium maritimae</i>		NE			X			X
DIPTERA	Dolicopodidae	<i>Medetera truncorum</i>		NE			X			
DIPTERA	Dolicopodidae	<i>Scellus notatus</i>		NE			X	X	X	
DIPTERA	Dolichopodidae	<i>Sciapus pallens</i>		NE					X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Dolichopodidae	<i>Syntormon pallipes</i>		NE			X	X		X
DIPTERA	Dolichopodidae	<i>Syntormon pseudospicatum</i>		DD	NS		X	X	X	X
DIPTERA	Limoniidae	<i>Symplecta stictica</i>		NE			X	X		
DIPTERA	Opomyzidae	<i>Geomyza tripunctata</i>		NE			X			
DIPTERA	Sarcophagidae	<i>Miltogramma punctata</i>		NE			X			
DIPTERA	Scathophagidae	<i>Scathophaga litorea</i>		NE			X		X	X
DIPTERA	Scathophagidae	<i>Scathophaga stercoraria</i>		NE			X		X	X
DIPTERA	Sciomyzidae	<i>Limnia unguicornis</i>		NE				X		

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Sciomyzidae	<i>Pherbina coryleti</i>		N E		X	X	X	X	
DIPTERA	Sciomyzidae	<i>Pherbellia schoenherri</i>		N E				X		
DIPTERA	Sepsidae	<i>Meroplus fukuharai</i>		N E				X		
DIPTERA	Sepsidae	<i>Sepsis cynipsea</i>		N E						X
DIPTERA	Sepsidae	<i>Sepsis fulgens</i>		N E			X			
DIPTERA	Stratiomyidae	<i>Chloromyia formosa</i>		L C		X	X	X		X
DIPTERA	Stratiomyidae	<i>Nemotelus notatus</i>		L C		X		X	X	X
DIPTERA	Stratiomyidae	<i>Nemotelus uliginosus</i>		L C				X		

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Stratiomyidae	<i>Pachygaster atra</i>		L C					X	
DIPTERA	Stratiomyidae	<i>Stratiomys singularior</i>		L C						X
DIPTERA	Syrphidae	<i>Chrysotoxum bicinctum</i>		L C		X			X	
DIPTERA	Syrphidae	<i>Episyrphus balteatus</i>		L C			X			
DIPTERA	Syrphidae	<i>Eristalis arbustorum</i>		L C			X			
DIPTERA	Syrphidae	<i>Eristalis tenax</i>		L C			X			
DIPTERA	Syrphidae	<i>Eristalinus aeneus</i>		L C			X		X	X
DIPTERA	Syrphidae	<i>Helophilus pendulus</i>		L C		X				

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Syrphidae	<i>Helophilus trivittatus</i>		L C		X				X
DIPTERA	Syrphidae	<i>Melanostoma mellinum</i>		L C		X				
DIPTERA	Syrphidae	<i>Melanostoma scalare</i>		L C					X	
DIPTERA	Syrphidae	<i>Pipizella viduata</i>		L C			X			
DIPTERA	Syrphidae	<i>Platycheirus fulviventris</i>		L C			X			X
DIPTERA	Syrphidae	<i>Sphaerophoria rueppellii</i>		L C			X			X
DIPTERA	Syrphidae	<i>Sphaerophoria scripta</i>		L C		X			X	
DIPTERA	Tabanidae	<i>Haematopota grandis</i>		L C	NS			X		

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Tachinidae	<i>Cistogaster globosa</i>		N E	RDB2	X	X			
DIPTERA	Tachinidae	<i>Eriothrix rufomaculata</i>		N E		X		X	X	
DIPTERA	Tephritidae	<i>Anomoia purmunda</i>		N E		X				
DIPTERA	Tephritidae	<i>Campiglossa plantaginis</i>		N E		X	X	X	X	X
DIPTERA	Tephritidae	<i>Dioxya bidentis</i>		N E	NS(Nb)		X			
DIPTERA	Tephritidae	<i>Myopites eximia</i>		N E	RDB2		X		X	X
DIPTERA	Tephritidae	<i>Myopites inulaedyssentericae</i>		N E	RDB3					X
DIPTERA	Tephritidae	<i>Paroxya misella</i>		N E			X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Tephritidae	<i>Sphenella marginata</i>		N E			X		X	X
DIPTERA	Tephritidae	<i>Tephritis divisa</i>		N E		X	X		X	X
DIPTERA	Tephritidae	<i>Tephritis formosa</i>		N E						X
DIPTERA	Tephritidae	<i>Tephritis neesii</i>		N E						X
DIPTERA	Tephritidae	<i>Tephritis ruralis</i>		N E					X	
DIPTERA	Thereviidae	<i>Thereva nobilitata</i>		L C			X			
DIPTERA	Ulidiidae	<i>Ceroxys urticae</i>		N E			X		X	
DIPTERA	Ulidiidae	<i>Melieria crassipennis</i>		N E		X	X		X	X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
DIPTERA	Ulidiidae	<i>Melieria omissa</i>		N E			X			X
DIPTERA	Ulidiidae	<i>Melieria picta</i>		N E	pNS	X	X	X	X	X
HEMIPTERA	Aphrophoridae	<i>Neophilaenus campestris</i>		N E		X	X	X	X	X
HEMIPTERA	Aphrophoridae	<i>Neophilaenus lineatus</i>		N E		X		X		
HEMIPTERA	Aphrophoridae	<i>Philaenus spumarius</i>		N E		X	X	X	X	X
HEMIPTERA	Cicadellidae	<i>Aphrodes makarovi</i>		N E			X			
HEMIPTERA	Cicadellidae	<i>Cicadula quadrinotata</i>		N E		X				
HEMIPTERA	Cicadellidae	<i>Conosanus obsoletus</i>		N E			X		X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Cicadellidae	<i>Graphocraerus ventralis</i>		N E		X				
HEMIPTERA	Cicadellidae	<i>Macropsis scotti</i>		N E			X			
HEMIPTERA	Cicadellidae	<i>Mocydia crocea</i>		N E		X		X	X	X
HEMIPTERA	Cicadellidae	<i>Paramesus obtusifrons</i>		N E		X				
HEMIPTERA	Cicadellidae	<i>Psammotettix helvolus</i>		N E			X			
HEMIPTERA	Cicadellidae	<i>Zyginidia scutellaris</i>		N E			X			
HEMIPTERA	Cixiidae	<i>Pentastiridius leporinus</i>		N E	NS(Nb)	X	X	X	X	X
HEMIPTERA	Cixiidae	<i>Reptalus quinquecostatus</i>		N E	NS(Nb)	X		X	X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Delphacidae	<i>Delphax pulchellus</i>		N E			X			
HEMIPTERA	Delphacidae	<i>Eurybregma nigrolineata</i>		N E		X				
HEMIPTERA	Delphacidae	<i>Javesella pellucida</i>		N E					X	
HEMIPTERA	Delphacidae	<i>Kelisia ribauti</i>		N E		X				
HEMIPTERA	Delphacidae	<i>Kosswigianella exigua</i>		N E			X			
HEMIPTERA	Delphacidae	<i>Muirodelphax aubei</i>		N E				X	X	
HEMIPTERA	Delphacidae	<i>Prokelisia marginata</i>		N E					X	
HEMIPTERA	Delphacidae	<i>Ribautodelphax imitans</i>		N E	S41, RDBK	X			X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Delphacidae	<i>Stenocranus minutus</i>		N E		X	X			
HEMIPTERA	Coreidae	<i>Ceraleptus lividus</i>	Slender-horned Leatherbug	L C	NS	X				
HEMIPTERA	Coreidae	<i>Coreus marginatus</i>	Dock Bug	L C		X	X			
HEMIPTERA	Coreidae	<i>Syromastus rhombeus</i>		L C				X		
HEMIPTERA	Lygaeidae	<i>Chilacis typhae</i>		N E		X				
HEMIPTERA	Lygaeidae	<i>Henestaris halophilus</i>		N E	RDB2			X		
HEMIPTERA	Lygaeidae	<i>Ischnodemus sabuleti</i>		N E		X	X	X	X	X
HEMIPTERA	Lygaeidae	<i>Kleidocerys resedae</i>		N E		X		X	X	X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Lygaeidae	<i>Nysius graminicola</i>		N E	RDB3	X	X		X	X
HEMIPTERA	Lygaeidae	<i>Nysius senecionis</i>		N E				X	X	X
HEMIPTERA	Lygaeidae	<i>Nysius thymi</i>		N E			X	X	X	X
HEMIPTERA	Lygaeidae	<i>Megalonotus emarginatus</i>		N E						X
HEMIPTERA	Lygaeidae	<i>Peritrechus nubilus</i>		N E				X		
HEMIPTERA	Lygaeidae	<i>Rhyparochromus vulgaris</i>		N E						X
HEMIPTERA	Lygaeidae	<i>Stygnocoris sabulosus</i>		N E				X		
HEMIPTERA	Miridae	<i>Capsus ater</i>		N E		X				

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Miridae	<i>Closterotomus norwegicus</i>		N E		X			X	X
HEMIPTERA	Miridae	<i>Liocoris tripustulatus</i>		N E		X				
HEMIPTERA	Miridae	<i>Lopus decolor</i>		N E		X				
HEMIPTERA	Miridae	<i>Lygus maritimus</i>		N E			X	X	X	X
HEMIPTERA	Miridae	<i>Lygus pratensis</i>		N E	RDB3	X	X	X	X	X
HEMIPTERA	Miridae	<i>Lygus rugulipennis</i>		N E			X	X	X	
HEMIPTERA	Miridae	<i>Miridius quadrivirgatus</i>		N E				X		
HEMIPTERA	Miridae	<i>Notostira elongata</i>		N E		X	X	X	X	X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Miridae	<i>Orthops kalmii</i>		N E		X			X	X
HEMIPTERA	Miridae	<i>Orthotylus flavosparsus</i>		N E			X		X	X
HEMIPTERA	Miridae	<i>Orthotylus moncreaffi</i>		N E			X	X	X	X
HEMIPTERA	Miridae	<i>Phytocoris varipes</i>		N E		X		X		
HEMIPTERA	Miridae	<i>Plagiognathus chrysanthemii</i>		N E						X
HEMIPTERA	Miridae	<i>Stenodema calcarata</i>		N E		X		X		
HEMIPTERA	Miridae	<i>Stenodema laevigata</i>		N E		X		X		
HEMIPTERA	Miridae	<i>Stenotus binotatus</i>		N E		X				

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Miridae	<i>Trigonotylus ruficornis</i>		N E				X		
HEMIPTERA	Nabidae	<i>Himacerus major</i>		N E			X			
HEMIPTERA	Nabidae	<i>Himacerus mirmicoides</i>		N E			X			
HEMIPTERA	Nabidae	<i>Nabis ferus</i>		N E				X		
HEMIPTERA	Nabidae	<i>Nabis flavomarginatus</i>		N E		X		X		
HEMIPTERA	Nabidae	<i>Nabis lineatus</i>		N E		X				
HEMIPTERA	Pentatomidae	<i>Aelia acuminata</i>	Bishop's Mitre Shieldbug	L C		X	X	X		X
HEMIPTERA	Pentatomidae	<i>Dolycoris baccarum</i>	Hairy Shieldbug	L C		X	X		X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HEMIPTERA	Pentatomidae	<i>Eurydema oleracea</i>	Brassica Shieldbug	L C		X				
HEMIPTERA	Pentatomidae	<i>Pentatoma rufipes</i>	Red-legged Shieldbug	L C			X			
HEMIPTERA	Pentatomidae	<i>Podops inuncta</i>	Turtle Shieldbug	L C				X		
HEMIPTERA	Piesmatidae	<i>Parapiesma quadratum</i>		N E			X	X	X	X
HEMIPTERA	Rhopalidae	<i>Liorhyssus hyalinus</i>		L C	NS					X
HEMIPTERA	Rhopalidae	<i>Stictopleurus abutilon</i>		N A		X				X
HEMIPTERA	Rhopalidae	<i>Stictopleurus punctatonervosus</i>		N A						X
HEMIPTERA	Scutelleridae	<i>Eurygaster testudinaria</i>	Tortoise Shieldbug	L C		X				

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Apidae	<i>Andrena bimaculata</i>	Large Gorse Mining Bee	N E	NS(Nb)		X			
HYMENOPTERA	Apidae	<i>Andrena dorsata</i>	Short-fringed Mining Bee	N E			X			
HYMENOPTERA	Apidae	<i>Andrena flavipes</i>	Yellow-legged Mining Bee	N E				X	X	X
HYMENOPTERA	Apidae	<i>Andrena labialis</i>	Large Meadow Mining Bee	N E		X	X	X	X	
HYMENOPTERA	Apidae	<i>Anthophora bimaculata</i>	Green-eyed Flower Bee	N E						X
HYMENOPTERA	Apidae	<i>Apis mellifera</i>	Honey Bee	N E		X	X	X	X	X
HYMENOPTERA	Apidae	<i>Bombus humilis</i>	Brown-banded Carder Bee	N E	S41	X	X	X	X	X
HYMENOPTERA	Apidae	<i>Bombus pascuorum</i>	Common Carder Bee	N E			X			X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Apidae	<i>Bombus sylvarum</i>	Shrill Carder Bee	N E	NS(Nb), S41	X	X	X	X	X
HYMENOPTERA	Apidae	<i>Bombus terrestris</i>	Buff-tailed Bumble-bee	N E			X		X	X
HYMENOPTERA	Apidae	<i>Ceratina cyanea</i>	Blue Carpenter Bee	N E	RDB3		X			X
HYMENOPTERA	Apidae	<i>Coelioxys conoidea</i>	Large Sharp-tail Bee	N E			X			
HYMENOPTERA	Apidae	<i>Coelioxys elongata</i>	Dull-vented Sharp-tail Bee	N E			X			
HYMENOPTERA	Apidae	<i>Colletes halophilus</i>	Sea Aster Bee	N E	NS(Na), S41		X		X	X
HYMENOPTERA	Apidae	<i>Dasygaster hirtipes</i>	Pantaloony Bee	N E	NS(Nb)		X			
HYMENOPTERA	Apidae	<i>Epeolus variegatus</i>		N E			X	X	X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Apidae	<i>Halictus rubicundus</i>		N E						X
HYMENOPTERA	Apidae	<i>Hylaeus dilatatus</i>	Chalk Yellow-face Bee	N E			X			X
HYMENOPTERA	Apidae	<i>Hylaeus hyalinatus</i>		N E						X
HYMENOPTERA	Apidae	<i>Lasioglossum leucopus</i>	White-footed Furrow Bee	N E						X
HYMENOPTERA	Apidae	<i>Lasioglossum malachurum</i>	Sharp-collared Furrow Bee	N E	NS(Nb)	X		X	X	X
HYMENOPTERA	Apidae	<i>Lasioglossum minutissimum</i>		N E			X			
HYMENOPTERA	Apidae	<i>Lasioglossum morio</i>		N E				X		X
HYMENOPTERA	Apidae	<i>Lasioglossum pauperatum</i>	Squat Furrow Bee	N E	RDB3		X		X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Apidae	<i>Lasioglossum pauxillum</i>	Lobe-spurred Furrow Bee	N E	NS(Na)			X		
HYMENOPTERA	Apidae	<i>Lasioglossum puncticolle</i>		N E	NS(Na)		X			
HYMENOPTERA	Apidae	<i>Lasioglossum villosulum</i>	Shaggy Furrow Bee	N E			X	X		
HYMENOPTERA	Apidae	<i>Megachile leachella</i>	Silvery Leafcutter Bee	N E	NS(Nb)		X			
HYMENOPTERA	Apidae	<i>Megachile maritima</i>	Coast Leafcutter Bee	N E			X			X
HYMENOPTERA	Apidae	<i>Melitta leporina</i>	Clover Melitta	N E		X				
HYMENOPTERA	Apidae	<i>Nomada fulvicornis</i>		N E	RDB3		X			
HYMENOPTERA	Apidae	<i>Osmia caerulescens</i>	Blue Mason Bee	N E			X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Apidae	<i>Osmia spinulosa</i>	Spined Mason Bee	N E						X
HYMENOPTERA	Apidae	<i>Panurgus banksianus</i>	Large Shaggy Bee	N E			X			
HYMENOPTERA	Apidae	<i>Sphecodes crassus</i>	Swollen-thighed Blood Bee	N E	NS(Nb)					X
HYMENOPTERA	Apidae	<i>Sphecodes ephippius</i>		N E						X
HYMENOPTERA	Apidae	<i>Sphecodes monilicornis</i>	Box-headed Blood Bee	N E				X		X
HYMENOPTERA	Chalcididae	<i>Brachymeria minuta</i>		N E			X			
HYMENOPTERA	Chrysididae	<i>Hedychridium ardens</i>		N E						X
HYMENOPTERA	Chrysididae	<i>Hedychrum nobile</i>		N E			X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Chrysididae	<i>Pseudomalus auratus</i>		N E						X
HYMENOPTERA	Crabronidae	<i>Astata boops</i>		N E			X			X
HYMENOPTERA	Crabronidae	<i>Cerceris quinquefasciata</i>	Five-banded Weevil Wasp	N E	RDB3, S41		X			X
HYMENOPTERA	Crabronidae	<i>Cerceris rybyensis</i>	Ornate-tailed Digger Wasp	N E			X			
HYMENOPTERA	Crabronidae	<i>Diodontus insidiosus</i>		N E	RDB3		X			
HYMENOPTERA	Crabronidae	<i>Ectemnius continuus</i>		N E			X			X
HYMENOPTERA	Crabronidae	<i>Ectemnius dives</i>		N E						X
HYMENOPTERA	Crabronidae	<i>Ectemnius rubicola</i>		N E			X			X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Crabronidae	<i>Mimumesa unicolor</i>		NE	NS(Na)		X			
HYMENOPTERA	Crabronidae	<i>Oxybelus uniglumis</i>	Common Spiny Digger Wasp	NE						X
HYMENOPTERA	Crabronidae	<i>Passaloecus gracilis</i>		NE						X
HYMENOPTERA	Crabronidae	<i>Pemphredon inornata</i>		NE		X		X		X
HYMENOPTERA	Crabronidae	<i>Pemphredon lethifer</i>		NE			X			X
HYMENOPTERA	Crabronidae	<i>Philanthus triangulum</i>	Bee Wolf	NE	RDB2		X			
HYMENOPTERA	Crabronidae	<i>Tachysphex nitidus</i>		NE						X
HYMENOPTERA	Crabronidae	<i>Tachysphex pompiliformis</i>		NE						X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Crabronidae	<i>Trypoxylon attenuatum</i>	Slender Wood Borer Wasp	N E			X		X	
HYMENOPTERA	Crabronidae	<i>Trypoxylon medium</i>		N E			X			
HYMENOPTERA	Formicidae	<i>Formica cunicularia</i>		N E		X	X			X
HYMENOPTERA	Formicidae	<i>Formica fusca</i>		N E			X			
HYMENOPTERA	Formicidae	<i>Lasius flavus</i>		N E			X	X		
HYMENOPTERA	Formicidae	<i>Lasius niger</i>		N E		X		X		X
HYMENOPTERA	Formicidae	<i>Myrmica sabuleti</i>		N E						X
HYMENOPTERA	Formicidae	<i>Myrmica scabrinodis</i>		N E		X			X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Mutillidae	<i>Smicromyrme rufipes</i>		NE	NS(Nb)					X
HYMENOPTERA	Pompilidae	<i>Arachnospila trivialis</i>		NE			X			
HYMENOPTERA	Pompilidae	<i>Episyron gallicum</i>		NE			X			
HYMENOPTERA	Pompilidae	<i>Evagetes pectinipes</i>		NE	RDB1					X
HYMENOPTERA	Pompilidae	<i>Priocnemis exaltata</i>		NE						X
HYMENOPTERA	Sphecidae	<i>Ammophila sabulosa</i>	Red Banded Sand Wasp	NE			X			X
HYMENOPTERA	Tenthredinidae	<i>Ametastegia glabrata</i>		NE					X	
HYMENOPTERA	Tenthredinidae	<i>Athalia rosae</i>		NE		X	X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
HYMENOPTERA	Tenthredinidae	<i>Euura clitellata</i>		NE				X		
HYMENOPTERA	Vespidae	<i>Ancistrocerus gazella</i>		NE			X			
HYMENOPTERA	Vespidae	<i>Vespula vulgaris</i>	Common Wasp	NE			X			X
LEPIDOPTERA	Crambidae	<i>Chrysoteuchia culmella</i>	Garden Grass-veneer	NE		X	X	X	X	
LEPIDOPTERA	Crambidae	<i>Crambus perlella</i>		NE				X		
LEPIDOPTERA	Erebidae	<i>Euclidia mi</i>	Mother Shipton	LC		X				
LEPIDOPTERA	Erebidae	<i>Tyria jacobaeae</i>	Cinnabar	LC	S41 RO	X				
LEPIDOPTERA	Gelechiidae	<i>Chrysoesthia sexguttella</i>		NE					X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
LEPIDOPTERA	Geometridae	<i>Aplocera plagiata</i>	Treble-bar	L C			X			
LEPIDOPTERA	Geometridae	<i>Eupithecia absinthiata</i>	Wormwood Pug	L C					X	
LEPIDOPTERA	Hesperiidae	<i>Thymelicus lineola</i>	Essex Skipper	L C		X	X	X		X
LEPIDOPTERA	Lycaenidae	<i>Aricia agestis</i>	Brown Argus	L C			X			
LEPIDOPTERA	Lycaenidae	<i>Celastrina argiolus</i>	Holly Blue	L C			X	X		X
LEPIDOPTERA	Lycaenidae	<i>Lycaena phlaeas</i>	Small Copper	L C				X		
LEPIDOPTERA	Lycaenidae	<i>Polyommatus icarus</i>	Common Blue	L C			X			
LEPIDOPTERA	Noctuidae	<i>Cucullia asteris</i>	Star Wort	L C	NS	X			X	

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
LEPIDOPTERA	Noctuidae	<i>Euclidia glyphica</i>	Burnet Companion	L C		X				
LEPIDOPTERA	Nymphalidae	<i>Aglais io</i>	Peacock	L C		X	X			X
LEPIDOPTERA	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	V U	S41	X				
LEPIDOPTERA	Nymphalidae	<i>Lasiommata megera</i>	Wall	E N	S41		X	X	X	
LEPIDOPTERA	Nymphalidae	<i>Maniola jurtina</i>	Meadow Brown	L C		X	X	X		X
LEPIDOPTERA	Nymphalidae	<i>Melanargia galathea</i>	Marbled White	L C		X		X		
LEPIDOPTERA	Nymphalidae	<i>Pyronia tithonus</i>	Gatekeeper	L C		X				
LEPIDOPTERA	Nymphalidae	<i>Vanessa cardui</i>	Painted Lady	L C		X	X			

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
LEPIDOPTERA	Pieridae	<i>Pieris brassicae</i>	Large White	L C		X	X	X	X	X
LEPIDOPTERA	Pieridae	<i>Pieris napi</i>	Green-veined White	L C		X	X	X	X	X
LEPIDOPTERA	Pyralidae	<i>Euzophera pinguis</i>		N E						X
ODONATA	Coenagriidae	<i>Ischnura elegans</i>	Blue-tailed Damselfly	L C		X	X			
ODONATA	Aeshnidae	<i>Aeshna mixta</i>	Migrant Hawker	L C		X	X	X		X
ODONATA	Libellulidae	<i>Sympetrum sanguineum</i>	Ruddy Darter	L C			X			
ODONATA	Libellulidae	<i>Sympetrum striolatum</i>	Common Darter	L C		X	X	X		X

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
ORTHOPTERA	Acrididae	<i>Chorthippus albomarginatus</i>	Lesser Marsh Grasshopper	L C			X	X		X
ORTHOPTERA	Acrididae	<i>Chorthippus brunneus</i>	Common Field Grasshopper	L C			X			X
ORTHOPTERA	Acrididae	<i>Chorthippus parallelus</i>	Meadow Grasshopper	L C			X			X
ORTHOPTERA	Conocephalidae	<i>Conocephalus discolor</i>	Long-winged Conehead	L C			X	X	X	X
ORTHOPTERA	Conocephalidae	<i>Conocephalus dorsalis</i>	Short-winged Conehead	L C		X		X		
ORTHOPTERA	Tettigoniidae	<i>Metrioptera roeselii</i>	Roesel's Bush Cricket	L C		X	X		X	X
TRICHOPTERA	Limnephilidae	<i>Glyphotaelius pellucidus</i>		L C		X				
TRICHOPTERA	Limnephilidae	<i>Limnephilus affinis</i>		L C		X		X		

Order	Family	Taxon	Vernacular	IUCN Status	GB rarity status	Compartment E1	Compartment F1	Compartment F2	Compartment F3	Compartment TFM10
TRICHOPTERA	Limnephilidae	<i>Limnephilus lunatus</i>		C L		X				

Appendix 2 – Unit photographs



View across the southern half of E1 © T. Bantock.



View west from the midpoint of F1 © T. Bantock



Views of the saline seepage in F2 on two dates under varying tidal conditions © T. Bantock.



View north across F3 © T. Bantock.



View across TFM10 © T. Bantock.

Appendix 3 – Invertebrate Status Codes

The new IUCN status codes

Many British invertebrate species have been assigned a formal status code. These codes are paramount in the definition of noteworthy species and accordingly, it is necessary to explain them here.

Natural England has recently instigated a new programme of invertebrate status reviews, in which species are assessed according to universally accepted criteria set by the International Union for the Conservation of Nature (IUCN) (IUCN 2012a, 2012b, 2014). In contrast to previous status assessments, which focussed largely on absolute rarity, the IUCN approach places each species into a threat category that also takes historic population trends into account. Species qualifying for a threat status (Critically Endangered, Endangered or Vulnerable) are those that are not only rare but also have a history of decline or extreme population fluctuations. Species not assigned to a threat category are categorised as Near Threatened, Least Concern, Data Deficient or Not Applicable.

As of 2016, a total of almost 4000 species have been reviewed in accordance with IUCN guidelines. All of these belong to groups that have readily available identification keys, active recorders and a history of recording. Progress with the IUCN invertebrate status review programme has recently been afforded a very useful summary (Webb & Brown, 2016).

A key to the IUCN status codes is given below and summarised in Fig. 1.

REGIONALLY EXTINCT (RE)

A taxon is Extinct when there is no reasonable doubt that the last individual has died.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Table 1). Critically Endangered species that are likely to be Extinct, but for which confirmation is still required are reported as Critically Endangered (Possibly Extinct), abbreviated as CR(PE).

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Table 1).

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Table 1).

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

NOT APPLICABLE (NA)

This category is typically used for introduced non-native species whether this results from accidental or deliberate importation. It may also be used for recent colonists (or attempted colonists) responding to the changing conditions available in Britain as a result of human activity and/or climate change. The IUCN regard 1500 as the cut-off date after which a species is classed as 'non-native'.

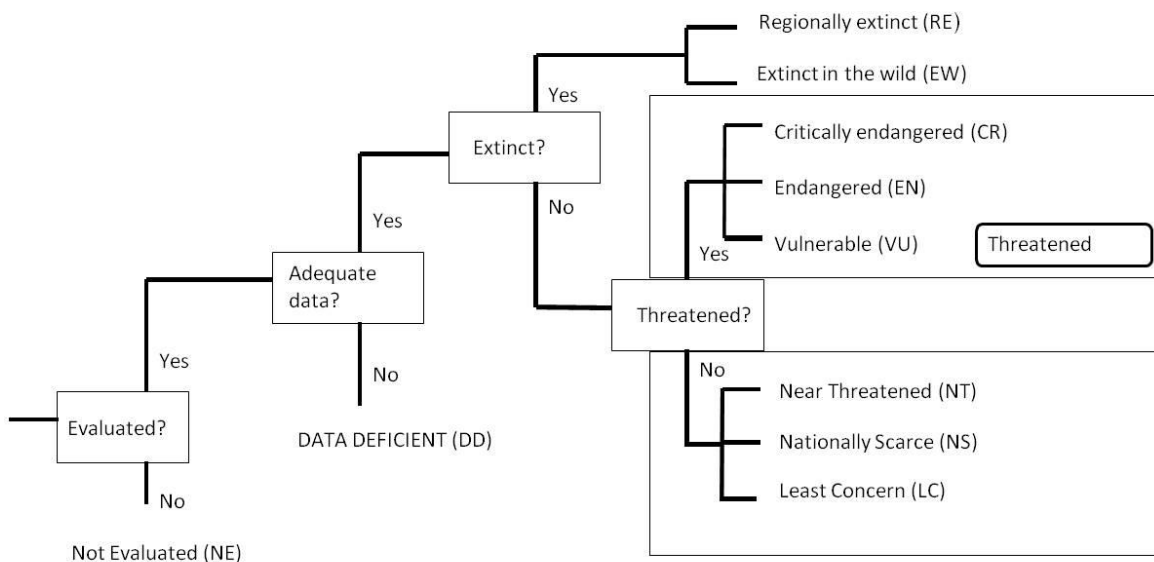


Figure 16: Hierarchical relationships of the categories (IUCN, 2001 under a CC-BY licence)

Taxa listed as Critically Endangered, Endangered or Vulnerable are defined as Threatened (Red List) species. For each of these threat categories there is a set of five main criteria A-E, with a number of sub-criteria within A, B and C (and an additional sub-criterion in D for the Vulnerable category), and one of which qualifies a taxon for listing at that level of threat. The qualifying thresholds within the criteria A-E differ between threat categories and are summarised in Table 1.

Table 10: Summary of the thresholds for the IUCN Criterion. Blank cells where there is no threshold for the IUCN criterion.

Criterion	<i>Critically Endangered</i>	<i>Endangered</i>	<i>Vulnerable</i>
A. Rapid decline	>80% over 10 years or 3 generations in past or future	>50% over 10 years or 3 generations in past or future	>30% over 10 years or 3 generations in past or future
B. Small range + fragmented, declining or fluctuating	Extent of occurrence <100 km ² or area of occupancy <10 km ² + two of the following: - severely fragmented or only a single location - continuing decline - extreme fluctuations	Extent of occurrence <5,000 km ² or area of occupancy <500 km ² + two of the following: - severely fragmented or no more than 5 locations - continuing decline - extreme fluctuations	Extent of occurrence 20,000 km ² or area of occupancy <2,000 km ² + two of the following: - severely fragmented or no more than 10 locations - continuing decline - extreme fluctuations
C. Small population and declining	<250 mature individuals, population declining	<2,500 mature individuals, population declining	<10,000 mature individuals, population declining
D. Very small population	<50 mature individuals	<250 mature individuals	D1. <1,000 mature individuals
D2. Very small area of occupancy			D2. <20 km ² or 5 or fewer locations
E. Quantifiable probability of extinction	>50% within 10 years or three generations	>20% within 20 years or five generations	>10% within 100 years

Curent GB rarity codes (IUCN assessed species)

The IUCN reviews also provide an assessment of rarity, based purely on the number of hectads (10km x 10km squares) in which any given species occurs. Two categories are defined:

Nationally Rare (NR)

Species recorded from between 1 and 15 hectads within a given date class when there is reasonable confidence that exhaustive recording would not find them in more hectads.

Nationally Scarce (NS)

Species recorded from between 16 and 100 hectads within a given date class when there is reasonable confidence that exhaustive recording would not find them in more hectads.

Broadly speaking, the Nationally Rare category is equivalent to the Red Data Book categories used by Shirt (1987) and Bratton (1991), namely: Endangered (RDB1), Vulnerable (RDB2), Rare (RDB3) and Insufficiently Known (RDBK). The Nationally Scarce category is directly equivalent to the combined Nationally Notable A (Na) and Nationally Notable B (Nb) categories introduced by the Nature Conservancy Council (Ball, 1986).

Current GB rarity codes (Non-IUCN assessed species)

For species not yet evaluated against the IUCN criteria, the most recent conservation status assessment is given, as specified by the Red Data Book categories (Shirt, 1987; Bratton, 1991) and Nationally Notable categories (Ball, 1986):

RDB1 (Endangered)

Taxa in danger of extinction and whose survival is unlikely if the

causal factors continue operating. These include:

- Species known from only a single locality since 1970.
- Species restricted to habitats that are especially vulnerable.
- Species which have shown a rapid and continuous decline in the last 20 years and are now estimated to exist in 5 or fewer localities.
- Species believed extinct but which would need protection if re-discovered.

RDB2 (Vulnerable)

Taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating. These include:

- Species declining throughout their range.
- Species in vulnerable habitats.
- Species whose populations are low.

RDB3 (Rare)

Taxa with small populations which are not at present endangered or vulnerable but which are at risk. These include:

- Species which are estimated to occur in 15 or fewer localities.

RDBK (Insufficiently known)

Taxa suspected to fall within the RDB categories but which are insufficiently known to enable placement.

RDBi (Indeterminate)

Taxa believed to qualify as either RDB1, RDB2 or RDB3 but which cannot be reliably placed into any category.

pRDB (Provisional)

The prefix 'p' before any Red Data Book category implies that the grading is provisional., pending the publication of a future edition of the Red Data Book.

Nationally Scarce species are those falling within the Nationally Notable categories introduced by Ball (1986). They are species that are estimated to occur within the range of 16 to 100 ten-kilometre squares of the British National Grid system since 1970. Notable species are subdivided as follows:

NS (Na)

Species estimated to occur within the range of 16 to 30 10-kilometre squares of the National Grid System, or for less well-recorded groups, within seven or fewer vice counties.

NS (Nb)

Species estimated to occur within the range 31 to 100 10-kilometre squares of the National Grid System, or for less well-recorded groups, between eight and 20 vice counties.

NS (N)

Species which are estimated to occur in 16 to 100 10 km squares in Great Britain. The subdividing of this category into Nationally Scarce A and Nationally Scarce B has not been attempted for some species because of either the degree of recording that has been carried out in the group to which the species belongs, or because there is some other reason why it is not possible to be so exact.

Recent provisional status assessments

Certain poorly recorded Dipteran groups have been subject to recent status assessment which is not based on comparisons of hectad data over two time periods (Falk et. al, 2016). This review uses IUCN status terminology with the added prefix 'p' (e.g. pVulnerable and pNationally Scarce) to indicate that these are provisional assessments based on data which would be insufficient for a formal IUCN status review. The category 'Data Deficient'efficient' (DD) is included.

