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Survey of aculeate Hymenoptera and Diptera assemblages at Dyfi National Nature Reserve – Ynyslas Dunes in 2019

N. Jones & I. Cheeseborough

NRW Evidence Report No. 381

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Report series: NRW Evidence Report
 Report number: 381
 Publication date: November 2019
 Contract number:
 Contractor: Nigel Jones & Ian Cheesborough
 Contract Manager: Justin Lyons
 Title: **Survey of aculeate Hymenoptera and Diptera assemblages at Dyfi National Nature Reserve – Ynyslas Dunes in 2019**
 Author(s): N. Jones & I. Cheeseborough
 Restrictions: None

Distribution List (core)

NRW Library, Bangor	2
National Library of Wales	1
British Library	1
Welsh Government Library	1
Scottish Natural Heritage Library	1
Natural England Library (Electronic Only)	1

Distribution List (others)

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Recommended citation for this volume:

Jones, N. & Cheeseborough, I. 2019. Survey of the aculeate Hymenoptera and Diptera assemblages at Dyfi National Nature Reserve – Ynyslas Dunes in 2019. NRW Evidence Report No: **381**, 36pp. Natural Resources Wales, Bangor.

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1. Crynodeb Gweithredol

Cynhaliwyd arolwg yn Nhwyni Ynys-las o glêr (Diptera) a gwenyn a gwenyn meirch yn y cytras Aculeata yn 2019 er mwyn ceisio canfod cyflwr cyfredol y safle hwn ar gyfer y grwpiau tacsonomig hyn. Cofnodwyd cyfanswm o 57 o rywogaethau yn y cytras Aculeata ac roedd 17 ohonynt yn rhai newydd i'r twyni, sy'n golygu bod cyfanswm o 119 o rywogaethau sydd bellach yn hysbys ar y safle. Dim ond 40 o'r 102 o rywogaethau yn y cytras Aculeata a gofnodwyd yn flaenorol a gafodd eu gweld eto yn 2019. Yn ystod yr arolwg presennol, cofnodwyd 22 o'r 38 o rywogaethau yn y cytras Aculeata a nodwyd fel rhan o gasgliad o infertebratau twyni Twyni Ynys-las (sy'n cynnwys 141 o rywogaethau o infertebratau ar hyn o bryd), ac ychwanegwyd pedair rhywogaeth gydnabyddedig sy'n ddibynnol ar dwyni at restr y safle. Cofnodwyd *Lasioglossum xanthopus* mewn ail leoliad yng Nghymru a chofnodwyd *Osmia bicolor* am y tro cyntaf yn VC46, sef ehangiad mawr yng nghynefin y ddwy rywogaeth.

Cofnodwyd 136 o rywogaethau o glêr yn 2019, gan gynnwys 21 o rywogaethau a gofnodwyd mewn llenyddiaeth gyhoeddedig fel rhywogaethau i'w gweld yn bennaf ar yr arfordir. Cofnodwyd naw o'r 13 o rywogaethau a nodwyd fel rhan o gasgliad o infertebratau twyni Twyni Ynys-las yn ystod yr arolwg, ac ychwanegwyd sawl rhywogaeth gydnabyddedig sy'n ddibynnol ar dwyni at restr y safle.

Amheuir dirywiad sylweddol yn ansawdd ffawna y safle sydd yn y cytras Aculeata yn 2019, a hynny o bosib o ganlyniad i haf poeth 2018, er nad arsylwyd unrhyw ddirywiadau yn ystod yr arolygon a gynhaliwyd gan yr awduron ar safleoedd eraill. Dadansoddwyd canlyniadau'r arolygon gan ddefnyddio cronfa ddata Pantheon, a awgrymodd fod rhywogaethau sy'n gysylltiedig â 'sialc a thywod moeth' ac 'adnodd sy'n gyfoethog o ran blodau' mewn cyflwr ffafriol. Fodd bynnag, mae hyn yn erbyn cefndir o golli 87% o dywod moel ar dwyni Cymru ers y 1940au, a fydd wedi cael effaith niweidiol ar infertebratau sy'n gysylltiedig ag amodau twyni arloesol, felly dylid bod yn ofalus wrth drin yr asesiad.

2. Executive Summary

A survey of the aculeate bees & wasps and flies (Diptera) of Ynyslas Dunes was undertaken in 2019 in an attempt to determine the current condition of this site for these taxonomic groups. A total of 57 aculeate species was recorded, 17 of which were new to the dunes resulting in a cumulative total of 119 species now known from the site. Only 40 of the 102 previously-recorded aculeates were refound in 2019. 22 of the 38 aculeate species identified as part of the Ynyslas Dunes dune invertebrate assemblage (currently consisting of 141 invertebrate species) were recorded during the current survey, and four recognized dune-dependent species were added to the site list. *Lasioglossum xanthopus* was recorded from a 2nd Welsh locality and *Osmia bicolor* was recorded new to VC46, both representing significant range expansions.

136 species of flies were recorded in 2019 including 21 species reported in published literature as being predominantly coastal species. Nine of the 13 species identified as part of the Ynyslas Dunes dune invertebrate assemblage were recorded during the survey, with several recognized dune-dependent species added to the site list.

A significant decline in the quality of the site's aculeate fauna in 2019 is suspected, perhaps as a result of the hot summer in 2018 although declines were not observed during surveys undertaken at other sites by the authors. Survey results were analysed using the Pantheon database tool which suggested that species associated with 'Bare sand & chalk' and 'Rich flower resource' are in favourable condition. However, this is set against a backdrop of a 87% loss of bare sand on Welsh dunes since the 1940s which will have had a detrimental impact upon invertebrates associated with pioneer dune conditions and therefore the assessment should be treated with caution.

3. Introduction

The Ynyslas Dunes section of the Dyfi National Nature Reserve, at the mouth of the Dyfi estuary, comprises 90ha of dunes at all stages of development. The dunes are fronted by a shingle ridge for much of their length and all stages of dune formation and habitat types are present. Much of the rear dune area has been levelled in the past for a golf course and a caravan site. During the 1939-1945 war, the dunes were occupied by the military and defence installations were constructed in the dunes, the remains of which can be seen in a few places. The dunes attract ca 250,000 visitors per year and visitor impact has been partially controlled by the use of boardwalks, marked routes and fenced areas to protect fragile habitats.

Ynyslas Dunes are an important element of the west coast dune systems which have developed between south Wales and the borders of Scotland. Many support populations of rare or threatened invertebrate species and important invertebrate assemblages associated with pioneer, sandy and xeric habitats. These include threatened aculeate bees and wasps or aculeates with a predominantly southern distribution whose range and distribution extends northwards via these dune systems. In addition, a number of Diptera species strongly associated with dune and other coastal habitats occur on dune systems in Wales. Ynyslas Dunes is the only UK locality for the ground spider *Agroeca dentigera* which is a qualifying feature of Dyfi SSSI along with the Sand-running Spider *Philodromus fallax*, the Vernal Bee *Colletes cunicularius* and the dune invertebrate assemblage. A provisional attempt by the Countryside Council for Wales to determine the species components of the assemblage identified 141 species (Table 1; Appendix 2) although, as this was undertaken nine years ago, it is likely to be out of date with new species recorded and changes in species' statuses (Mike Howe, pers. comm.). The total includes 38 species of aculeate Hymenoptera. At that time, Ynyslas Dunes was ranked as the 10th most important Welsh dune system for its invertebrates.

Table 1. Taxa comprising the dune invertebrate assemblage on Dyfi SSSI, Ynyslas Dunes (Mike Howe, pers. comm.). The Bees & Wasps total includes 38 aculeates and a single chalcid wasp. See Appendix 2 for explanation of Grade 1 to 3 species.

Taxon	Grade 1	Grade 2	Grade 3	No. species
Spiders	2	3	9	14
Beetles	10	16	30	56
Flies	1	5	7	13
Bugs	1	1	3	5
Bees & Wasps	3	9	27	39
Woodlice	-	1	-	1
Moths	3	4	5	12
Lacewings	1	-	-	1
-	21	39	81	141

Previous surveys of the aculeate fauna of Ynyslas Dunes were undertaken in 2001 (Clee, 2001, 2002) and 2007 (Clee, 2008). A total of 73 species was recorded in 2001 including 11 Nationally Rare and Nationally Scarce species - the solitary wasps *Mimumesa littoralis*, *Nysson dimidiatus*, *Oxybelus argentatus*, *O. mandibularis* and *Podalonia hirsuta*, the spider wasp *Arachnospila wesmaeli*, the jewel wasp *Hedychridium cupreum* and the solitary bees *Coelioxys mandibularis*, *Dasypoda*

hirtipes, *Megachile leachella* and *Stelis ornatula* (see Appendix 3). The Brown-banded Carder Bee *Bombus humilis* was also found. The 2007 survey recorded 84 species including nine of the Nationally Rare and Nationally Scarce species recorded in 2001 but failed to re-find *H. cupreum* and *O. mandibularis*. With historic records of three bumble bees and *ad hoc* records of *Bethylus cephalotes* and *Gonatopus striatus* in 2014 and *Lasius brunneus* in 2013, the cumulative total of aculeates on Ynyslas Dunes stood at 102 species in 2014.

The first objective of the 2019 survey was to confirm the current status of all previously-recorded Nationally Rare and Nationally Scarce aculeate species as these are likely to form part of the dune invertebrate assemblage SSSI feature. The second objective was to establish a baseline list of dune-associated Diptera (flies) on Ynyslas Dunes. A total of 14 fly species is included in the CCW assemblage list (Table 1; Appendix 2).

4. Methods

Five days were spent on Ynyslas Dunes between 5th May and 2nd August 2019, visiting when suitable warm and sunny conditions were forecast. On each day, at least two entomologists undertook survey work. The majority of the fieldwork was undertaken by the authors, Nigel Jones and Ian Cheeseborough, assisted on occasion by Richard Becker. Survey days were:

5th May 2019: Warm with sunny conditions throughout the day;

19th May 2019: Warm with sunny conditions throughout the day;

20th June 2019: Warm with sunny conditions throughout the day;

16th July 2019: Very warm with sunny conditions throughout the day;

2nd August 2019: Warm with sunny conditions throughout the day.

For recording purposes, the site was divided into three compartments duplicating the recording areas used on the previous surveys (Figure 1).

Compartment 1, the section of dunes east of the beach access road.

Compartment 2, the dunes north of a line from the visitor centre to the view point at the end of the southern boardwalk.

Compartment 3, the dunes to the south of this line.

All types of habitat were visited by searching widely in each area, but with a particular focus on sparsely-vegetated areas.



Figure 1. Survey Compartments 1 to 3.

Areas and habitats important for aculeate Hymenoptera were noted. Specimens were obtained by hand searching, sweep netting and pan traps set out in various locations within each compartment. Locations of nest aggregations and significant species were recorded using GPS. Care was taken not to damage plants or habitat whilst traversing the dunes. A potentially key dune blowout was not sampled until July in order to avoid disturbing nesting ringed plover. Voucher specimens of cryptic species are retained in the private collections of Ian Cheeseborough and Nigel Jones.

5. Results

5.1 Aculeate Hymenoptera

57 species of aculeate were recorded during the survey including one species IUCN red-listed in Europe (*Colletes fodiens*), two Nationally Rare species (*Colletes cunicularius* and *Mimumesa littoralis*) and seven Nationally Scarce species (*Andrena bimaculata*, *Dasypoda hirtipes*, *Lasioglossum xanthopus*, *Megachile leachella*, *Osmia*

bicolor, *Oxybelus argentatus* and *Podalonia hirsuta* – see Table 3). 17 of the 57 species recorded are additions to the Ynyslas Dunes site list of aculeates including *A. bimaculata* and *L. xanthopus*, resulting in a cumulative total of 119 species. 62 species (52%) previously recorded from Ynyslas were not detected in 2019 including *Arachnospila wesmaeli*, *Coelioxys mandibularis*, *Hedychridium cupreum*, *Lasius brunneus*, *Nysson dimidiatus*, *Oxybelus mandibularis*, *Stelis ornatula* and *Bombus humilis*. Twenty-two of the species recorded are recognized as part of the Ynyslas dune assemblage (Table 2) but new site records of dune-dependent *Coelioxys conoidea*, *Coelioxys inermis*, *Colletes similis* and *O. bicolor* (all Grade 3 species) have been added as a consequence of this survey.

Table 2. Aculeates recorded in 2019 that are recognized as part of the Ynyslas dune invertebrate assemblage.

Species	Family	Status	Grade	2019
<i>Andrena barbilabris</i>	Apidae	Local	3	x
<i>Coelioxys elongata</i>	Apidae	Local	3	x
<i>Coelioxys mandibularis</i>	Apidae	Nationally Rare	1	-
<i>Coelioxys rufescens</i>	Apidae	Unknown	3	x
<i>Colletes cunicularius</i>	Apidae	Nationally Rare	1	x
<i>Colletes fodiens</i>	Apidae	Common	3	x
<i>Dasypoda hirtipes</i>	Apidae	Nationally Scarce	2	x
<i>Epeolus cruciger</i>	Apidae	Local	3	-
<i>Epeolus variegatus</i>	Apidae	Local	3	x
<i>Hoplitis claviventris</i>	Apidae	Common	3	-
<i>Megachile circumcincta</i>	Apidae	Common	3	-
<i>Megachile leachella</i>	Apidae	Nationally Scarce	2	x
<i>Megachile maritima</i>	Apidae	Unknown	3	x
<i>Osmia aurulenta</i>	Apidae	Local	3	-
<i>Sphecodes pellucidus</i>	Apidae	Local	3	x
<i>Stelis ornatula</i>	Apidae	Nationally Rare	2	-
<i>Hedychridium ardens</i>	Chrysididae	Common	3	x
<i>Hedychridium cupreum</i>	Chrysididae	Nationally Scarce	2	-
<i>Cerceris arenaria</i>	Crabronidae	Common	3	x
<i>Crabro cribrarius</i>	Crabronidae	Local	3	x
<i>Crabro peltarius</i>	Crabronidae	Local	3	-
<i>Crossocerus wesmaeli</i>	Crabronidae	Common	3	x
<i>Dryudella pinguis</i>	Crabronidae	Local	2	-
<i>Harpactus tumidus</i>	Crabronidae	Local	3	-
<i>Mimumesa littoralis</i>	Crabronidae	Nationally Rare	2	x
<i>Nysson dimidiatus</i>	Crabronidae	Nationally Scarce	3	-
<i>Oxybelus argentatus</i>	Crabronidae	Nationally Scarce	2	x
<i>Oxybelus mandibularis</i>	Crabronidae	Nationally Scarce	2	-
<i>Oxybelus uniglumis</i>	Crabronidae	Common	3	x
<i>Tachysphex nitidus</i>	Crabronidae	Local	2	-
<i>Tachysphex pompiliiformis</i>	Crabronidae	Local	3	-
<i>Anoplius infuscatus</i>	Pompilidae	Local	3	x
<i>Arachnospila wesmaeli</i>	Pompilidae	Nationally Scarce	3	-
<i>Episyron rufipes</i>	Pompilidae	Local	3	x
<i>Evagetes crassicornis</i>	Pompilidae	Local	3	-

Species	Family	Status	Grade	2019
<i>Pompilus cinereus</i>	Pompilidae	Local	3	x
<i>Ammophila sabulosa</i>	Sphecidae	Local	3	x
<i>Podalonia hirsuta</i>	Sphecidae	Nationally Scarce	3	x

A good population of *Colletes fodiens* was detected, particularly around ragwort flowers in Compartment 2. *C. fodiens* is Vulnerable in Europe but widespread on dunes in the UK. A single specimen of *Mimumesa littoralis* was located on the edge of the dune blow out in Area 3 at SN60509368. Nearby to this point are many patches of sea spurge *Euphorbia paralias* with which the wasp may be associated. *Oxybelus argentatus* was detected in compartments 2 and 3. At least ten specimens were found across Compartments 2 and 3, with pinpointed records from the dune blow out at SN605936 (Compartment 3) and the nearby blow out at SN605938 (Compartment 2). An individual was recorded on the fore dune at SN604934 (Compartment 3).

Good numbers of *Megachile leachella* were detected in scattered areas of Compartments 2 and 3, mainly on sparsely-vegetated slopes. Extensive nest aggregations were discovered at SN605936 and SN605935. *Podalonia hirsuta* was noted at seven locations in Compartments 2 and 3. Several adults of *Dasypoda hirtipes* were found on 16th July and 2nd August in Compartments 2 and 3 at four locations, mainly foraging at yellow Asteracea. A single female of *Osmia bicolor* was seen on the foreshore at SN604935. New to Ynyslas Dunes, the record marks a significant range expansion northward in Wales. A single female of *Lasioglossum xanthopus* was captured in a pan trap in Compartment 2 at the newly-scraped area of dune at SN60829443. This record also marks a significant range expansion northward in Wales.

New species for the site list included three that have an association with dunes or sandy substrates:

Ancistrocerus scoticus – strongly associated with coastal sites in Wales and capable of burrowing to make nests;

Colletes similis – a mining bee strongly associated with coastal sites in Wales;

Coelioxys conoidea – a cleptoparasite of the Coastal Leaf-Cutter Bee *Megachile maritima*.

The survey commenced too late to coincide with the early emergence of the Nationally Rare Vernal Bee *Colletes cunicularius*. Just two females were seen on 4th May in Compartment 1 on hawthorn flowers and in Compartment 3 on 19 May. The Site Manager reported that nesting assemblages had been detected during April in Compartments 2 and 3. This bee has undergone a dramatic recent range expansion and now occurs at a number of inland sandy sites as well as at its original Welsh and NW England coastal dune sites.

Table 3. Aculeate Hymenoptera with conservation designations recorded from Ynyslas Dunes. NR = Nationally Rare; NS = Nationally Scarce.

Species	Vernacular Name	Family	Status	2001	2008	2019 abundance	Other
<i>Hedychridium cupreum</i>	a jewel wasp	Chrysididae	NS	x	-	-	-

Species	Vernacular Name	Family	Status	2001	2008	2019 abundance	Other
<i>Arachnospila wesmaeli</i>	a spider wasp	Pompilidae	NS	x	x	-	-
<i>Lasius brunneus</i>	Brown Ant	Formicidae	NS	-	-	-	2013
<i>Mimumesa littoralis</i>	a solitary wasp	Crabronidae	NR	x	x	1	-
<i>Nysson dimidiatus</i>	Small Spurred Digger Wasp	Crabronidae	NS	x	x	-	-
<i>Oxybelus argentatus</i>	Silver Spiny Digger Wasp	Crabronidae	NS	x	x	>5	-
<i>Oxybelus mandibularis</i>	Pale Jawed Spiny Digger Wasp	Crabronidae	NS	x	-	-	-
<i>Podalonia hirsuta</i>	Hairy Sand Wasp	Sphecidae	NS	x	x	5	-
<i>Andrena bimaculata</i>	a mining bee	Apidae	NS	-	-	1	-
<i>Bombus humilis</i>	Brown-banded Carder-bee	Apidae	BAP	x	x	-	-
<i>Bombus ruderals</i>	Large Garden Bumble Bee	Apidae	Local	-	-	-	1974
<i>Bombus soroeensis</i>	Broken-belted Bumble Bee	Apidae	Local	-	-	-	1983
<i>Bombus subterraneus</i>	Short Haired Bumble Bee	Apidae	NS	-	-	-	1922
<i>Coelioxys mandibularis</i>	a cuckoo bee	Apidae	NR	x	x	-	-
<i>Colletes cunicularius</i>	Vernal Bee	Apidae	NR	-	-	1	1998
<i>Colletes fodiens</i>	a mining bee	Apidae	VU (Europe)	x	x	>5	-
<i>Dasypoda hirtipes</i>	Hairy Legged Mining Bee	Apidae	NS	x	x	>5	-
<i>Lasioglossum xanthopus</i>	Yellow Footed Mining Bee	Apidae	NS	-	-	1	-
<i>Megachile leachella</i>	Silvery Leaf-Cutter Bee	Apidae	NS	x	x	>5	-
<i>Osmia bicolor</i>	Two Coloured Mason Bee	Apidae	NS	-	-	1	-
<i>Stelis ornatula</i>	a solitary bee	Apidae	NR	x	x	-	-

5.2 Diptera

136 species of Diptera were recorded during the 2019 survey. Table 4 lists the Diptera families recorded. Species recorded included seven which are Nationally Scarce (see Table 5), 21 species that are considered to have an association with coastal dune or sandy habitats were recorded (see Table 6) and ten of the 14 species identified as part of the SSSI dune assemblage (Table 7), including *Dolichopus notatus* – new to the site list. Several other flies considered to be dune species were recorded for the first time including *Coremacera marginata*, *Delia albula*, *Helina prostrubans*, *Phthiria pulicaria*, *Tetanops myopina*, *Tethina albasetulosa* and *Tomosvaryella littoralis*.

Table 4. Diptera families recorded in 2019.

Family	English name (if any)
Anthomyiidae	-
Asilidae	Robberflies
Bibionidae	St Mark's flies
Bombyliidae	Bee-flies
Calliphoridae	Blowflies
Canacidae	-
Chamaemyiidae	Silver-flies
Chloropidae	Frit-flies
Conopidae	Thick-headed flies
Diastatidae	-
Dolichopodidae	Long-legged flies
Drosophilidae	Fruit flies
Empididae	Dance flies
Hybotidae	-
Lauxaniidae	-

Family	English name (if any)
Lonchaeidae	Lance-flies
Muscidae	House flies
Pipunculidae	Big-headed flies
Platystomatidae	-
Psilidae	-
Rhagionidae	Snipe-flies
Rhinophoridae	Woodlouse flies
Sarcophagidae	Flesh flies and Satellite flies
Sciomyzidae	Snail-killing flies
Sepsidae	-
Syrphidae	Hoverflies
Tachinidae	Parasitoid flies
Tephritidae	a family of Picture-wing flies
Therevidae	Stiletto flies
Trixoscelidae	-
Ulidiidae	a family of Picture-wing flies

Table 5. Diptera with conservation statuses recorded during 2019.

Species and family	Status	Notes
<i>Dolichopus notatus</i>	Nationally Scarce	Habitat – wet parts of dune systems and upper saltmarsh
<i>Dialineura anilis</i> (Therevidae)	Nationally Scarce	Habitat – coastal sand dunes
<i>Phthiria pulicaria</i> (Bombyliidae)	Nationally Scarce	Habitat – coastal sand dunes
<i>Tetanops myopina</i> (Ulidiidae)	pNationally Scarce	Mainly coastal dunes, occasionally beaches. Mobile foredunes with Marram <i>Ammophila arenaria</i> seem to be preferred.
<i>Helina protuberans</i> (Muscidae)	pNationally Scarce	Habitat – coastal sand dunes
<i>Villeneuveia aestuum</i> (Muscidae)	pNationally Scarce	Sea coasts, on beaches and river estuaries, usually on wet sand.
<i>Sarcophaga latifrons</i> (Sarcophagidae)	pNationally Scarce	Usually coastal grassland, dunes and beaches, but occasionally inland heathland.

Table 6. Diptera recorded during 2019 that are associated with dune and related coastal habitats.

Species	Family	Habitat and reference
<i>Hilara cantabrica</i>	Empididae	Coast-frequenting (salt marsh) species (Collin, 1961)
<i>Dolichopus notatus</i>	Dolichopodidae	wet parts of dune systems and upper saltmarsh (Drake, 2018)
<i>Machaerium maritimae</i>	Dolichopodidae	Estuarine and saltmarsh species (D'Assis Fonseca, 1978)
<i>Dysmachus trigonus</i>	Asilidae	Fixed dunes (Howe, 2010)
<i>Philonicus albiceps</i>	Asilidae	Yellow dunes (Howe, 2010)
<i>Acrosathe annulata</i>	Therevidae	Yellow dunes (Howe, 2010)
<i>Tomosvaryella littoralis</i>	Pipunculidae	Restricted to coastal sand dunes (Földvári & De Meyer, 1999; Howe, 2010)
<i>Tethina albosetulosa</i>	Canacidae	Thalassobiont (sea loving) species mainly inhabiting sandy beaches. (Munari, 2011; Howe, 2010)
<i>Tethina illota</i>	Canacidae	Sea coasts on <i>Cakile maritima</i> (Shtakel'berg, 1970; Howe, 2010)

Species	Family	Habitat and reference
<i>Chamaemyia flavipalpis</i>	Chamaemyiidae	Yellow dunes (Howe, 2010)
<i>Meromyza pratorum</i>	Chloropidae	Dry meadows and sandy coastal habitats (Nartshuk & Anderson, 2013; Howe, 2010)
<i>Trixoscelis obscurella</i>	Trixoscelidae	Yellow dunes (Howe, 2010)
<i>Coremacera marginata</i>	Sciomyzidae	Fixed dunes (Howe, 2010)
<i>Pherbellia cinerella</i>	Sciomyzidae	Fixed dunes (Howe, 2010)
<i>Trupanea stellata</i>	Tephritidae	Often on ragwort in yellow dunes (Howe, 2010)
<i>Sphenella marginata</i>	Tephritidae	Often on ragwort in yellow dunes (Howe, 2010)
<i>Delia albula</i>	Anthomyiidae	Coastal sand dunes (Ackland <i>et al.</i> , 2017; Howe, 2010)
<i>Delia pallipennis</i>	Anthomyiidae	Sandy places (Ackland <i>et al.</i> , 2017; Howe, 2010)
<i>Delia penicillosa</i>	Anthomyiidae	On coasts (Ackland <i>et al.</i> , 2017)
<i>Sarcophaga filia</i>	Sarcophagidae	calcareous habitats including western dunes (Falk, no date)
<i>Senotainia conica</i>	Sarcophagidae	Fixed dunes (Howe, 2010)
<i>Prosenia siberita</i>	Tachinidae	Heathland and dunes (Belshaw, 1993)

Table 7. Diptera regarded as being part of the SSSI dune assemblage.

Species	Order	Family	Status	Grade	2019
<i>Dysmachus trigonus</i>	Diptera	Asilidae	Local	3	x
<i>Philonicus albiceps</i>	Diptera	Asilidae	Local	3	x
<i>Chamaemyia flavipalpis</i>	Diptera	Chamaemyiidae	Unknown	3	x
<i>Meromyza pratorum</i>	Diptera	Chloropidae	Unknown	2	x
<i>Dolichopus notatus</i>	Diptera	Dolichopodidae	Nationally Scarce	3	x
<i>Hercostomus praetextatus</i>	Diptera	Dolichopodidae	Nationally Scarce	3	-
<i>Hilara lundbecki</i>	Diptera	Empididae	Local	3	-
<i>Philygria punctatonervosa</i>	Diptera	Ephydriidae	Unknown	2	-
<i>Trixoscelis obscurella</i>	Diptera	Heleomyzidae	Local	2	x
<i>Senotainia conica</i>	Diptera	Sarcophagidae	Local	2	x
<i>Gonia ornata</i>	Diptera	Tachinidae	Local	2	-
<i>Tethina illota</i>	Diptera	Tethinidae	Unknown	3	x
<i>Acrosathe annulate</i>	Diptera	Therevidae	Local	3	x
<i>Dialineura anilis</i>	Diptera	Therevidae	Nationally Rare	1	x

6. Discussion

Before 2019, 102 aculeate species had been recorded from the site. Only 40 of these species were refound in 2019, with 17 species new to the site. *Lasioglossum xanthopus* is otherwise only known from a single hectad in Glamorgan and the nearest population of *Osmia bicolor* is on the Castlemartin peninsula in Pembrokeshire (Appendix 4). Species not noted included a number of widespread species of sandy sites such as *Crossocerus quadrimaculatus* and *Diodontus tristis* which are usually numerous on coastal dune sites. Other normally fairly common species of dunes such as *Crabro cribrarius* and *Ammophila sabulosa* were seen as singletons or in very low numbers only. Of the 38 aculeate species regarded by NRW as being part of the dune assemblage, only 22 (58%) were refound in 2019 although four new species should be added as a consequence of the survey. As no thresholds have been set, this may be an acceptable percentage to record in a single season

but appears to be on the lower end of acceptability particularly as population abundances were so low.

Key to the maintenance of populations of aculeates on sand dunes is the provision of suitable areas of bare sand that provide suitable nesting habitat and the warm microclimate preferred by many species, with often extensive areas of forage and food plants. Work that has been undertaken to create new areas of exposed sand in the fixed dunes should continue to provide suitable conditions for nesting sand-mining species. Scrub areas and stands of Ragwort *Senecio jacobaea*, Hogweed *Heracleum spondylium*, Rosebay Willow-herb *Epilobium angustifolium* and *Rubus* species not only provide forage sources but their stems provide nesting habitat for aerial breeding species. There appears to be a good supply of forage and nectar resources across the site so lack of this resource is unlikely to be a significant issue. The advice given in the report of the 2007 survey (Clee, 2008) regarding presence of *Salix* is worth repeating - “*Salix repens* and *Salix cinerea* are important forage sources for *Colletes cunicularius* and also some of the early species of bee including *Andrena bicolor*, *Andrena barbilabris* and *Andrena nigroaenea*. In particular, a certain amount of *Salix cinerea* should be retained as a nectar source for male *Colletes cunicularius*, which emerge before the females and usually before the flowering of *Salix repens*.”

The 2019 survey has provided a useful baseline of the Diptera found on Ynyslas Dunes, recording nine of the 13 identified components of the assemblage and adding several dune species new to the site.

Overall, flying insect activity appeared to be extremely low throughout the season, apart from July when numbers were higher. This surprising paucity of insect numbers was not mirrored at other sites surveyed by the authors in 2019. It is difficult to suggest a reason for this apparent decline in aculeate populations on Ynyslas Dunes, as suitable habitat appears to be present over substantial areas. It is possible that the extremely hot and dry season of 2018 may have had an impact on insect numbers which may have had a knock-on effect on insect numbers in 2019. Without data from seasons leading up to 2018, it is not possible to explore this possible scenario.

In view of the possible dramatic decline in species numbers and diversity on Ynyslas Dunes, it is recommended that attempts are made to ensure that recording of aculeates is carried out on a more regular basis. This could be undertaken using pantraps and sending material to entomologists for determination, as well as regular field work to search for and capture aculeates for identification (either in the field or by sending specimens to entomologists). It should be possible to find willing entomologists, either within NRW or volunteer/paid entomologists to help determine specimens. A possible source for volunteers would be an organisation such as BWARS who are usually keen to gather aculeate data from sites around the UK. More regular recording should help to detect species that may be present in very low numbers and will be less susceptible to bias than surveys undertaken every ten surveys, which can be affected by the “boom and bust” cycles of many insect populations.

Pantheon Assessment of the Ynyslas dune invertebrate assemblages

The data for invertebrate species made by the 2019 survey was uploaded to the Pantheon database tool (Webb *et al.*, 2017). Pantheon provides an indication of the quality and condition of a site for invertebrate assemblages found in a wide range of habitats. Ideally, a comprehensive set of records, covering most invertebrate orders should be used to make assessments. The 2019 dataset is strongly focussed on Aculeate Hymenoptera and Diptera only, and with this in mind the assessment provided by Pantheon must be regarded as at best indicative. None-the-less the analysis reported “Favourable Condition” for two species assemblage types:

Bare sand & chalk SAT: Based on the occurrence of 27 species represented in the national set of 453 SAT species;

Rich flower resource SAT: Based on the occurrence of 22 species represented in the national set of 219 SAT species.

However, this is in a scenario of decreasing bare sand on UK dunes since the 1940s with a 87% loss of bare sand on Welsh dune systems (Howe *et al.*, 2012). As this will have had a detrimental impact upon invertebrates associated with pioneer dune conditions, as populations have become restricted to ever-decreasing areas of suitable habitat, the analyses should be treated with caution.

7. Acknowledgements

Thanks to Justin Lyons, Natural Resources Wales for administering this contract and Mike Howe (also of NRW) for commenting on a draft of the report. Thanks are also due to Chloe Hardman, Charles Griffiths and Richard Becker for kindly assisting with field work during May and July.

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9. Appendices

Appendix 1. Invertebrate species identified as likely components of the Dyfi SSSI (Ynyslas Dunes) qualifying dune assemblage by Natural Resources Wales. Grade 1 species are restricted to sand dunes in the UK, Grade 2 species are restricted to sand dunes in Wales and Grade 3 species are predominantly found in Wales on dunes. Dune codes are given in Appendix 2. Note that all aculeate bees are now classified within a single family, Apidae.

Species	Order	Family	Status	Grade	Dune code
<i>Cheiracanthium virescens</i>	Araneae	Clubionidae	Local	3	SD440
<i>Argenna subnigra</i>	Araneae	Dictynidae	Local	3	SD440
<i>Haplodrassus minor</i>	Araneae	Gnaphosidae	Nationally Rare	3	SD930
<i>Zelotes electus</i>	Araneae	Gnaphosidae	Local	2	SD440
<i>Ceratinopsis romana</i>	Araneae	Linyphiidae	Nationally Scarce	3	SD510
<i>Mecopisthes peusi</i>	Araneae	Linyphiidae	Nationally Scarce	2	SD450
<i>Troxochrus scabriculus</i>	Araneae	Linyphiidae	Local	3	SD510
<i>Agroeca dentigera</i>	Araneae	Liocranidae	Nationally Rare	1	SD510
<i>Arctosa perita</i>	Araneae	Lycosidae	Local	3	SD510
<i>Xerolycosa miniata</i>	Araneae	Lycosidae	Local	2	SD520
<i>Philodromus fallax</i>	Araneae	Philodromidae	Nationally Scarce	1	SD510
<i>Thanatus striatus</i>	Araneae	Philodromidae	Local	3	SD521
<i>Marpissa nivoyi</i>	Araneae	Salticidae	Nationally Scarce	3	SD510
<i>Xysticus kochi</i>	Araneae	Thomisidae	Local	3	SD720
<i>Notoxus monocerus</i>	Coleoptera	Anthicidae	Local	3	SD440
<i>Holotrichapion ononis</i>	Coleoptera	Apionidae	Local	3	SD460
<i>Agonum gracilipes</i>	Coleoptera	Carabidae	Nationally Scarce	2	SD440
<i>Amara apricaria</i>	Coleoptera	Carabidae	Common	3	SD520
<i>Amara convexior</i>	Coleoptera	Carabidae	Local	3	SD440
<i>Amara lucida</i>	Coleoptera	Carabidae	Nationally Scarce	2	SD460
<i>Amara praetermissa</i>	Coleoptera	Carabidae	Nationally Scarce	3	SD460
<i>Amara tibialis</i>	Coleoptera	Carabidae	Local	3	SD460
<i>Bembidion pallidipenne</i>	Coleoptera	Carabidae	Nationally Scarce	2	SD930
<i>Broscus cephalotes</i>	Coleoptera	Carabidae	Local	3	SD935
<i>Calathus cinctus</i>	Coleoptera	Carabidae	Local	3	SD440
<i>Calathus erratus</i>	Coleoptera	Carabidae	Common	3	SD440
<i>Calathus mollis</i>	Coleoptera	Carabidae	Local	3	SD935
<i>Cicindela maritima</i>	Coleoptera	Carabidae	Nationally Scarce	1	SD450
<i>Dyschirius impunctipennis</i>	Coleoptera	Carabidae	Nationally Scarce	2	SD930
<i>Dyschirius politus</i>	Coleoptera	Carabidae	Local	3	SD440
<i>Harpalus anxius</i>	Coleoptera	Carabidae	Local	3	SD520
<i>Harpalus tardus</i>	Coleoptera	Carabidae	Local	3	SD460
<i>Trechus fulvus</i>	Coleoptera	Carabidae	Nationally Scarce	3	SD930
<i>Chrysomela populi</i>	Coleoptera	Chrysomelidae	Local	3	SD545
<i>Cryptocephalus aureolus</i>	Coleoptera	Chrysomelidae	Nationally Scarce	3	SD520

Species	Order	Family	Status	Grade	Dune code
<i>Psylliodes marcida</i>	Coleoptera	Chrysomelidae	Local	1	SD500
<i>Ceutorhynchus atomus</i>	Coleoptera	Curculionidae	Nationally Scarce	3	SD440
<i>Glocianus punctiger</i>	Coleoptera	Curculionidae	Nationally Scarce	3	SD520
<i>Gronops lunatus</i>	Coleoptera	Curculionidae	Nationally Scarce	3	SD460
<i>Otiorhynchus atroapterus</i>	Coleoptera	Curculionidae	Local	1	SD510
<i>Philopodon plagiatus</i>	Coleoptera	Curculionidae	Local	2	SD445
<i>Sitona griseus</i>	Coleoptera	Curculionidae	Local	1	SD460
<i>Dryops nitidulus</i>	Coleoptera	Dryopidae	Nationally Rare	2	SD435
<i>Agrypnus murinus</i>	Coleoptera	Elateridae	Local	3	SD520
<i>Baeckmanniolus dimidiatus</i>	Coleoptera	Histeridae	Nationally Scarce	1	SD910
<i>Saprinus cuspidatus</i>	Coleoptera	Histeridae	Nationally Scarce	2	SD910
<i>Leiodes dubia</i>	Coleoptera	Leiodidae	Local	3	SD830
<i>Nacerdes melanura</i>	Coleoptera	Oedemeridae	Local	3	SD930
<i>Aegialia arenaria</i>	Coleoptera	Scarabaeidae	Local	1	SD450
<i>Anomala dubia</i>	Coleoptera	Scarabaeidae	Local	1	SD520
<i>Aphodius foetidus</i>	Coleoptera	Scarabaeidae	Common	3	SD910
<i>Aphodius plagiatus</i>	Coleoptera	Scarabaeidae	Nationally Scarce	2	SD830
<i>Psammodytes asper</i>	Coleoptera	Scarabaeidae	Nationally Scarce	2	SD450
<i>Anotylus maritimus</i>	Coleoptera	Staphylinidae	Local	2	SD930
<i>Atheta exigua</i>	Coleoptera	Staphylinidae	Unknown	2	SD001
<i>Bledius fergussoni</i>	Coleoptera	Staphylinidae	Local	3	SD435
<i>Bledius fuscipes</i>	Coleoptera	Staphylinidae	Unknown	2	SD435
<i>Bledius longulus</i>	Coleoptera	Staphylinidae	Local	2	SD435
<i>Gabrieus keysianus</i>	Coleoptera	Staphylinidae	Nationally Scarce	3	SD930
<i>Gabrieus osseticus</i>	Coleoptera	Staphylinidae	Nationally Scarce	3	SD435
<i>Heterothops binotatus</i>	Coleoptera	Staphylinidae	Local	3	SD001
<i>Ocypus compressus</i>	Coleoptera	Staphylinidae	Local	3	-
<i>Omalius rugulipenne</i>	Coleoptera	Staphylinidae	Nationally Rare	2	SD930
<i>Oxypoda lurida</i>	Coleoptera	Staphylinidae	Nationally Scarce	2	SD440
<i>Phytosus balticus</i>	Coleoptera	Staphylinidae	Local	2	SD930
<i>Polystomota punctatella</i>	Coleoptera	Staphylinidae	Unknown	3	SD930
<i>Melanimon tibialis</i>	Coleoptera	Tenebrionidae	Local	1	SD440
<i>Opatrum sabulosum</i>	Coleoptera	Tenebrionidae	Nationally Scarce	3	SD440
<i>Phaleria cadaverina</i>	Coleoptera	Tenebrionidae	Local	1	SD930
<i>Phylan gibbus</i>	Coleoptera	Tenebrionidae	Local	1	SD930
<i>Dysmachus trigonus</i>	Diptera	Asilidae	Local	3	SD521
<i>Philonicus albiceps</i>	Diptera	Asilidae	Local	3	SD450
<i>Chamaemyia flavipalpis</i>	Diptera	Chamaemyiidae	Unknown	3	SD510
<i>Meromyza pratorum</i>	Diptera	Chloropidae	Unknown	2	SD510
<i>Hercostomus praetextatus</i>	Diptera	Dolichopodidae	Nationally Scarce	3	SD435
<i>Hilara lundbecki</i>	Diptera	Empididae	Local	3	SD500
<i>Philygria punctatonevosa</i>	Diptera	Ephydriidae	Unknown	2	SD440
<i>Trioxyscelis obscurella</i>	Diptera	Heleomyzidae	Local	2	SD910
<i>Senotainia conica</i>	Diptera	Sarcophagidae	Local	2	SD450
<i>Gonia ornata</i>	Diptera	Tachinidae	Local	2	SD440
<i>Tethina illota</i>	Diptera	Tethinidae	Unknown	3	SD440
<i>Acrosathe annulata</i>	Diptera	Therevidae	Local	3	SD440

Species	Order	Family	Status	Grade	Dune code
<i>Dialineura anilis</i>	Diptera	Therevidae	Nationally Rare	1	SD520
<i>Gampsicoris punctipes</i>	Hemiptera	Berytinidae	Common	3	SD460
<i>Kelisia sabulicola</i>	Hemiptera	Delphacidae	Local	2	SD460
<i>Muirodelphax aubei</i>	Hemiptera	Delphacidae	Local	3	SD500
<i>Trigonotylus psammaecolor</i>	Hemiptera	Miridae	Nationally Scarce	1	SD510
<i>Dicranocephalus agilis</i>	Hemiptera	Stenocephalidae	Nationally Scarce	3	SD440
<i>Andrena barbilabris</i>	Hymenoptera	Andrenidae	Local	3	SD445
<i>Epeolus cruciger</i>	Hymenoptera	Anthophoridae	Local	3	SD921
<i>Epeolus variegatus</i>	Hymenoptera	Anthophoridae	Local	3	SD921
<i>Perilampus aureoviridis</i>	Hymenoptera	Chalcidae	Unknown	1	SD440
<i>Hedychridium ardens</i>	Hymenoptera	Chrysidae	Common	3	SD921
<i>Hedychridium cupreum</i>	Hymenoptera	Chrysidae	Nationally Scarce	2	SD921
<i>Colletes cunicularius</i>	Hymenoptera	Colletidae	Nationally Rare	1	SD450
<i>Colletes fodiens</i>	Hymenoptera	Colletidae	Common	3	SD450
<i>Sphecodes pellucidus</i>	Hymenoptera	Halictidae	Local	3	SD921
<i>Coelioxys elongate</i>	Hymenoptera	Megachilidae	Local	3	SD921
<i>Coelioxys mandibularis</i>	Hymenoptera	Megachilidae	Nationally Rare	1	SD921
<i>Coelioxys rufescens</i>	Hymenoptera	Megachilidae	Unknown	3	SD921
<i>Hoplitis claviventris</i>	Hymenoptera	Megachilidae	Common	3	SD570
<i>Megachile circumcincta</i>	Hymenoptera	Megachilidae	Common	3	SD440
<i>Megachile dorsalis</i>	Hymenoptera	Megachilidae	Nationally Scarce	2	SD450
<i>Megachile maritima</i>	Hymenoptera	Megachilidae	Unknown	3	SD445
<i>Osmia aurulenta</i>	Hymenoptera	Megachilidae	Local	3	SD520
<i>Stelis ornatula</i>	Hymenoptera	Megachilidae	Nationally Rare	2	SD570
<i>Dasypoda altercator</i>	Hymenoptera	Melittidae	Nationally Scarce	2	SD440
<i>Anoplius infuscatus</i>	Hymenoptera	Pompilidae	Local	3	SD445
<i>Arachnospila wesmaeli</i>	Hymenoptera	Pompilidae	Nationally Scarce	3	SD445
<i>Episyron rufipes</i>	Hymenoptera	Pompilidae	Local	3	SD445
<i>Evagetes crassicornis</i>	Hymenoptera	Pompilidae	Local	3	SD445
<i>Pompilus cinereus</i>	Hymenoptera	Pompilidae	Local	3	SD445
<i>Ammophila sabulosa</i>	Hymenoptera	Sphecidae	Local	3	SD445
<i>Cerceris arenaria</i>	Hymenoptera	Sphecidae	Common	3	SD450
<i>Crabro cribrarius</i>	Hymenoptera	Sphecidae	Local	3	SD450
<i>Crabro peltarius</i>	Hymenoptera	Sphecidae	Local	3	SD450
<i>Crossocerus wesmaeli</i>	Hymenoptera	Sphecidae	Common	3	SD450
<i>Dryudella pinguis</i>	Hymenoptera	Sphecidae	Local	2	SD440
<i>Harpactus tumidus</i>	Hymenoptera	Sphecidae	Local	3	SD450
<i>Mimumesa littoralis</i>	Hymenoptera	Sphecidae	Nationally Rare	2	SD510
<i>Nysson dimidiatus</i>	Hymenoptera	Sphecidae	Nationally Scarce	3	SD921
<i>Oxybelus argentatus</i>	Hymenoptera	Sphecidae	Nationally Scarce	2	SD440
<i>Oxybelus mandibularis</i>	Hymenoptera	Sphecidae	Nationally Scarce	2	SD440
<i>Oxybelus uniglumis</i>	Hymenoptera	Sphecidae	Common	3	SD445
<i>Podalonia hirsute</i>	Hymenoptera	Sphecidae	Nationally Scarce	3	SD445
<i>Tachysphex nitidus</i>	Hymenoptera	Sphecidae	Local	2	SD450
<i>Tachysphex pompiliiformis</i>	Hymenoptera	Sphecidae	Local	3	SD450
<i>Armadillidium album</i>	Isopoda	Armadillidiidae	Nationally Scarce	2	SD930
<i>Bryotropha umbrosella</i>	Lepidoptera	Gelechiidae	Local	2	SD545

Species	Order	Family	Status	Grade	Dune code
<i>Chionodes distinctella</i>	Lepidoptera	Gelechiidae	Nationally Scarce	2	SD001
<i>Actebia praecox</i>	Lepidoptera	Noctuidae	Nationally Scarce	3	SD545
<i>Agrotis ripae</i>	Lepidoptera	Noctuidae	Nationally Scarce	1	SD500
<i>Agrotis vestigialis</i>	Lepidoptera	Noctuidae	Local	3	SD520
<i>Euxoa cursoria</i>	Lepidoptera	Noctuidae	Nationally Scarce	1	SD460
<i>Euxoa tritici</i>	Lepidoptera	Noctuidae	Common	3	SD520
<i>Mythimna litoralis</i>	Lepidoptera	Noctuidae	Nationally Scarce	1	SD510
<i>Pyrrhia umbra</i>	Lepidoptera	Noctuidae	Local	3	SD460
<i>Sideridis albicolon</i>	Lepidoptera	Noctuidae	Nationally Scarce	2	SD500
<i>Anerastia lotella</i>	Lepidoptera	Pyrilidae	Local	3	SD510
<i>Collicularia microgrammana</i>	Lepidoptera	Tortricidae	Nationally Scarce	2	SD460
<i>Wesmaelius balticus</i>	Neuroptera	Hemerobiidae	Nationally Scarce	1	SD510

Appendix 2. A provisional attempt by Natural Resources Wales to assign invertebrate species to microhabitats, in this case dune habitats. This classification is now redundant and likely to be superseded by the Pantheon classification developed by Natural England and the Biological Records Centre.

Code	Dune Habitat
SD001	Sand dunes and pits (unspecified)
SD110	dune pools & shallow sandy streams
SD330	tall fen (eg. reedbeds) in dune slacks, etc.
SD430	bare mud in mature dune slacks, saltmarsh transition, pool margins, etc.
SD435	wet or damp bare and sparsely vegetated sand (pioneer dune slacks etc.)
SD440	dry bare/sparsely vegetated sand
SD445	dry bare or sparsely vegetated loose sand (mainly fore-dunes)
SD450	dry bare or sparsely vegetated firm sand (blow-outs, margins of paths, etc.)
SD460	phytophagous on low plants in open sand
SD500	beach flora (Cakile, Beta, Agropyron, etc.)
SD510	tussocks/litter in yellow dunes (marram and lyme grass)
SD515	litter in stable dune grassland
SD520	dry herb-rich grassland (fixed dune)
SD521	tall sward dune grassland
SD545	wet or damp vegetated areas (mature dune slacks etc.), inc. creeping willow
SD570	hollow plant stems (bramble etc.)
SD590	ruderals (thistles, Epilobium, etc.)
SD600	dune heath
SD720	dune scrub (inc. aspen, hawthorn, burnet rose, etc.)
SD740	willow and alder carr
SD830	-
SD910	dung or carrion on sand
SD920	-
SD921	-
SD930	strandline (including accumulations of decaying seaweed) & lower shore
SD935	-

Appendix 3. List of the 119 aculeate Hymenoptera recorded from Ynyslas Dunes, including those found during surveys in 2001, 2007 and 2019. NR = Nationally Rare; NS = Nationally Scarce. The 38 species recognized as part of the dune assemblage are highlighted in red.

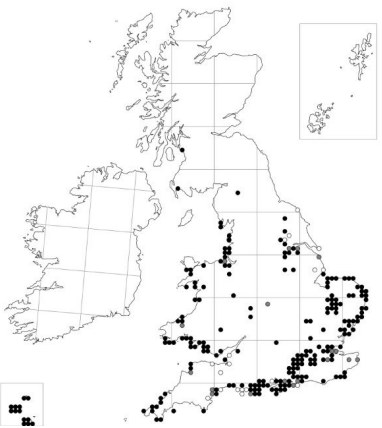
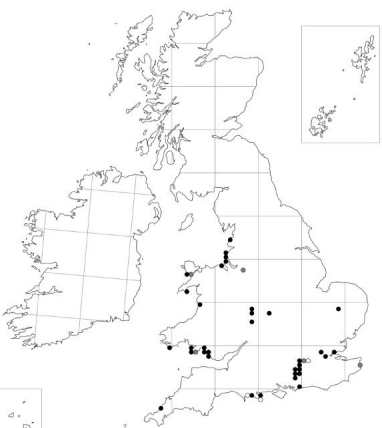
Species	Vernacular Name	Family	Status	2001	2008	2019	Other
<i>Bethylus cephalotes</i>	a wasp	Bethylidae	Common	-	-	-	2014
<i>Gonatopus striatus</i>	a wasp	Dryinidae	Unknown	-	-	-	2014
<i>Chrysis ignita</i>	a jewel wasp	Chrysididae	Common	x	x	-	-
<i>Chrysis impressa</i>	a jewel wasp	Chrysididae	Common	-	-	x	-
<i>Chrysis terminata</i>	a jewel wasp	Chrysididae	Unknown	-	-	x	-
<i>Hedychridium ardens</i>	a jewel wasp	Chrysididae	Common	x	x	x	-
<i>Hedychridium cupreum</i>	a jewel wasp	Chrysididae	NS	x	-	-	-
<i>Anoplius infuscatus</i>	a spider wasp	Pompilidae	Local	-	x	x	-
<i>Anoplius nigerrimus</i>	a spider wasp	Pompilidae	Local	-	-	x	-
<i>Arachnospila anceps</i>	a spider wasp	Pompilidae	Local	x	-	-	-
<i>Arachnospila wesmaeli</i>	a spider wasp	Pompilidae	NS	x	x	-	-
<i>Episyron rufipes</i>	Red Legged Spider Wasp	Pompilidae	Local	x	x	x	-
<i>Evagetes crassicornis</i>	a spider wasp	Pompilidae	Local	x	x	-	-
<i>Pompilus cinereus</i>	Leaden Spider Wasp	Pompilidae	Local	x	x	x	-
<i>Priocnemis exaltata</i>	a spider wasp	Pompilidae	Local	-	x	-	-
<i>Formica fusca</i>	Negro Ant	Formicidae	Common	x	x	x	-
<i>Lasius alienus</i>	an ant	Formicidae	Local	x	x	-	-
<i>Lasius brunneus</i>	Brown Ant	Formicidae	NS	-	-	-	2013
<i>Lasius flavus</i>	Yellow Meadow Ant	Formicidae	Common	x	x	x	-
<i>Lasius fuliginosus</i>	Jet Ant	Formicidae	Common	x	x	-	-
<i>Lasius niger</i>	Small Black Ant	Formicidae	Common	x	x	x	-
<i>Myrmica ruginodis</i>	a red ant	Formicidae	Common	x	x	x	-
<i>Myrmica sabuleti</i>	a red ant	Formicidae	Local	x	x	-	-
<i>Ancistrocerus gazella</i>	a potter wasp	Vespidae	Common	-	x	-	-
<i>Ancistrocerus parietinus</i>	a potter wasp	Vespidae	Common	x	-	-	-
<i>Ancistrocerus parietum</i>	Wall Mason Wasp	Vespidae	Common	x	-	-	-
<i>Ancistrocerus scoticus</i>	a potter wasp	Vespidae	Local	-	-	x	-
<i>Vespula germanica</i>	German Wasp	Vespidae	Common	x	x	x	-
<i>Vespula rufa</i>	Red Wasp	Vespidae	Common	-	x	-	-
<i>Vespula vulgaris</i>	Common Wasp	Vespidae	Common	x	-	x	-
<i>Argogorytes mystaceus</i>	Field Digger Wasp	Crabronidae	Local	-	x	-	-
<i>Cerceris arenaria</i>	Sand Tailed Digger Wasp	Crabronidae	Common	x	x	x	-
<i>Crabro cribrarius</i>	Slender Bodied Digger Wasp	Crabronidae	Local	x	x	x	-
<i>Crabro peltarius</i>	a digger wasp	Crabronidae	Local	x	x	-	-
<i>Crossocerus elongatulus</i>	Slender Digger Wasp	Crabronidae	Common	-	x	-	-
<i>Crossocerus quadrimaculatus</i>	4-Spotted Digger Wasp	Crabronidae	Common	x	x	-	-
<i>Crossocerus wesmaeli</i>	Wesmael's Digger Wasp	Crabronidae	Common	x	x	x	-
<i>Diodontus tristis</i>	Melancholy Black Wasp	Crabronidae	Local	x	x	-	-
<i>Dryudella pinguis</i>	a solitary wasp	Crabronidae	Local	x	x	-	-
<i>Ectemnius continuus</i>	a solitary wasp	Crabronidae	Common	-	x	-	-
<i>Harpactus tumidus</i>	a solitary wasp	Crabronidae	Local	x	x	-	-
<i>Mellinus arvensis</i>	Field Digger Wasp	Crabronidae	Common	x	x	x	-
<i>Mimumesa littoralis</i>	a solitary wasp	Crabronidae	NR	x	x	x	-
<i>Nysson dimidiatus</i>	Small Spurred Digger Wasp	Crabronidae	NS	x	x	-	-
<i>Nysson spinosus</i>	Large Spurred Digger Wasp	Crabronidae	Common	-	x	-	-
<i>Oxybelus argentatus</i>	Silver Spiny Digger Wasp	Crabronidae	NS	x	x	x	-
<i>Oxybelus mandibularis</i>	Pale Jawed Spiny Digger Wasp	Crabronidae	NS	x	-	-	-
<i>Oxybelus uniglumis</i>	Common Spiny Digger Wasp	Crabronidae	Common	x	x	x	-
<i>Passaloecus gracilis</i>	a solitary wasp	Crabronidae	Common	-	x	-	-
<i>Pemphredon lethifera</i>	Little Black Wasp	Crabronidae	Common	x	-	x	-
<i>Tachysphex nitidus</i>	a solitary wasp	Crabronidae	Local	-	x	-	-
<i>Tachysphex pompliformis</i>	a solitary wasp	Crabronidae	Local	x	x	-	-
<i>Trypoxylon attenuatum</i>	Slender Wood Borer Wasp	Crabronidae	Common	x	x	-	-
<i>Trypoxylon figulus</i>	Black Wood Borer Wasp	Crabronidae	Common	-	x	-	-
<i>Ammophila sabulosa</i>	Red Banded Sand Wasp	Sphecidae	Local	x	x	x	-
<i>Podalonia hirsuta</i>	Hairy Sand Wasp	Sphecidae	NS	x	x	x	-
<i>Andrena barbilabris</i>	a mining bee	Apidae	Local	x	x	x	-
<i>Andrena haemorrhoa</i>	Early Mining Bee	Apidae	Common	x	-	x	-

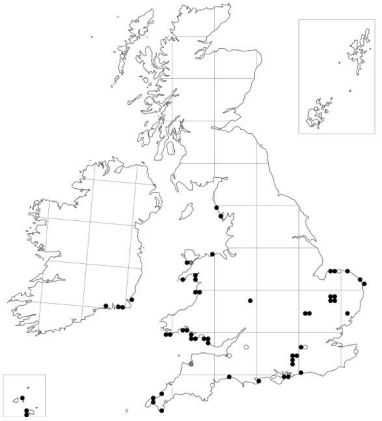
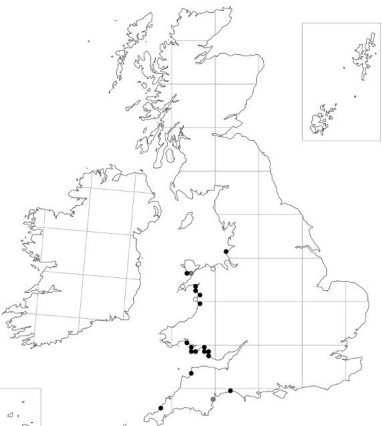
Species	Vernacular Name	Family	Status	2001	2008	2019	Other
<i>Andrena nigroaenea</i>	a mining bee	Apidae	Common	x	x	-	-
<i>Andrena bicolor</i>	Gwynne's Mining Bee	Apidae	Common	-	x	-	-
<i>Andrena bimaculata</i>	a mining bee	Apidae	NS	-	-	x	-
<i>Andrena cineraria</i>	Grey Mining Bee	Apidae	Local	-	-	x	-
<i>Andrena flavipes</i>	Yellow Legged Mining Bee	Apidae	Local	-	-	x	-
<i>Andrena labialis</i>	a mining bee	Apidae	Local	-	x	-	-
<i>Andrena thoracica</i>	a mining bee	Apidae	Common	-	x	-	-
<i>Anthophora furcata</i>	Fork Tailed Flower Bee	Apidae	Local	x	x	-	-
<i>Apis mellifera</i>	Honey Bee	Apidae	Common	x	x	x	-
<i>Bombus bohemicus</i>	Gipsy Cuckoo Bee	Apidae	Common	x	x	-	-
<i>Bombus humilis</i>	Brown-banded Carder-bee	Apidae	Local	x	x	-	-
<i>Bombus jonellus</i>	Heath Bumble Bee	Apidae	Local	-	-	x	-
<i>Bombus lapidarius</i>	Large Red Tailed Bumble Bee	Apidae	Common	x	x	x	-
<i>Bombus lucorum</i>	White-tailed Bumble Bee	Apidae	Common	x	x	x	-
<i>Bombus muscorum</i>	Moss Carder-bee	Apidae	Local	-	x	-	-
<i>Bombus pascuorum</i>	Common Carder Bee	Apidae	Common	x	x	x	-
<i>Bombus pratorum</i>	Early Bumble Bee	Apidae	Common	x	x	-	-
<i>Bombus ruderals</i>	Large Garden Bumble Bee	Apidae	Local	-	-	-	1974
<i>Bombus soroeensis</i>	Broken-belted Bumble Bee	Apidae	Local	-	-	-	1983
<i>Bombus subterraneus</i>	Short Haired Bumble Bee	Apidae	NS	-	-	-	1922
<i>Bombus terrestris</i>	Buff-Tailed Bumble Bee	Apidae	Common	x	x	x	-
<i>Bombus vestalis</i>	Vestal Cuckoo Bee	Apidae	Common	x	x	-	-
<i>Coelioxys conoidea</i>	a cuckoo bee	Apidae	Local	-	-	x	-
<i>Coelioxys elongata</i>	a cuckoo bee	Apidae	Local	x	x	x	-
<i>Coelioxys inermis</i>	a cuckoo bee	Apidae	Local	-	-	x	-
<i>Coelioxys mandibularis</i>	a cuckoo bee	Apidae	NR	x	x	-	-
<i>Coelioxys rufescens</i>	a cuckoo bee	Apidae	Unknown	-	x	x	-
<i>Colletes cunicularius</i>	Vernal Bee	Apidae	NR	-	-	x	1998
<i>Colletes fodiens</i>	a mining bee	Apidae	Common	x	x	x	-
<i>Colletes similis</i>	a mining bee	Apidae	Local	-	-	x	-
<i>Dasypoda hirtipes</i>	Hairy Legged Mining Bee	Apidae	NS	x	x	x	-
<i>Epeolus cruciger</i>	a cuckoo bee	Apidae	Local	-	x	-	-
<i>Epeolus variegatus</i>	a cuckoo bee	Apidae	Local	x	x	x	-
<i>Halictus rubicundus</i>	a solitary bee	Apidae	Common	x	x	x	-
<i>Halictus tumulorum</i>	a solitary bee	Apidae	Common	x	-	-	-
<i>Hoplitis claviventris</i>	a solitary bee	Apidae	Common	x	x	-	-
<i>Hylaeus brevicornis</i>	Short Horned Yellow-Face Bee	Apidae	Local	x	x	x	-
<i>Hylaeus communis</i>	Common Yellow Face Bee	Apidae	Local	-	-	x	-
<i>Hylaeus hyalinatus</i>	a solitary bee	Apidae	Local	-	x	x	-
<i>Lasioglossum albipes</i>	a solitary bee	Apidae	Common	x	x	-	-
<i>Lasioglossum calceatum</i>	Slender Mining Bee	Apidae	Common	-	x	-	-
<i>Lasioglossum leucozonium</i>	a solitary bee	Apidae	Common	-	-	x	-
<i>Lasioglossum punctatissimum</i>	a solitary bee	Apidae	Local	x	x	-	-
<i>Lasioglossum villosulum</i>	Shaggy Mining Bee	Apidae	Common	-	-	x	-
<i>Lasioglossum xanthopus</i>	Yellow Footed Mining Bee	Apidae	NS	-	-	x	-
<i>Megachile circumcincta</i>	a leaf-cutter bee	Apidae	Common	-	x	-	-
<i>Megachile leachella</i>	Silvery Leaf-Cutter Bee	Apidae	NS	x	x	x	-
<i>Megachile maritima</i>	Coastal Leaf-Cutter Bee	Apidae	Unknown	x	x	x	-
<i>Megachile versicolor</i>	a leaf-cutter bee	Apidae	Local	x	-	-	-
<i>Megachile willughbiella</i>	Willughby's Leaf-Cutter Bee	Apidae	Common	x	x	-	-
<i>Nomada flava</i>	a nomad bee	Apidae	Common	x	x	-	-
<i>Nomada goodeniana</i>	Gooden's Nomad Bee	Apidae	Common	x	x	-	-
<i>Nomada panzeri</i>	a nomad bee	Apidae	Common	-	x	-	-
<i>Nomada ruficornis</i>	Red-horned Nomad Bee	Apidae	Local	-	-	x	-
<i>Osmia aurulenta</i>	Gold-Fringed Mason Bee	Apidae	Local	x	x	-	-
<i>Osmia bicolor</i>	Two Coloured Mason Bee	Apidae	NS	-	-	x	-
<i>Osmia bicornis</i>	Red Mason Bee	Apidae	Common	-	x	x	-
<i>Sphecodes geoffrellus</i>	a cuckoo bee	Apidae	Common	x	x	-	-
<i>Sphecodes gibbus</i>	a cuckoo bee	Apidae	Common	x	-	-	-
<i>Sphecodes pellucidus</i>	a cuckoo bee	Apidae	Local	x	x	x	-
<i>Stelis ornatula</i>	a solitary bee	Apidae	NR	x	x	-	-
-	-	-	-	73	84	57	-

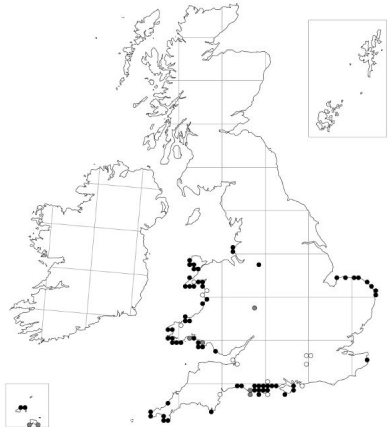
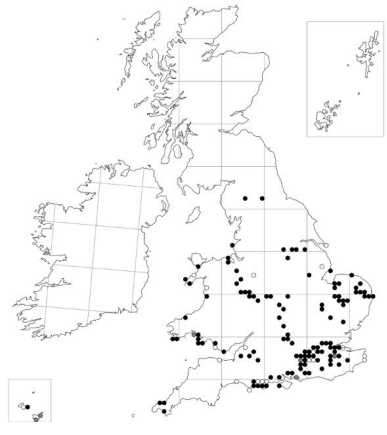
Appendix 4. Profiles of Nationally Rare and Nationally Scarce Aculeate Hymenoptera recorded on Ynyslas Dunes.

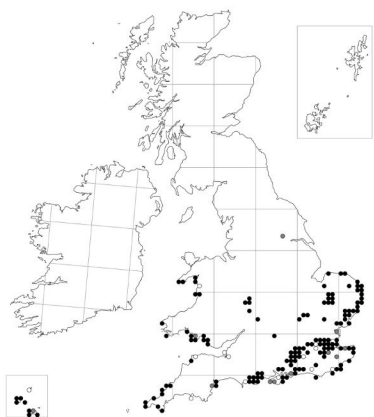
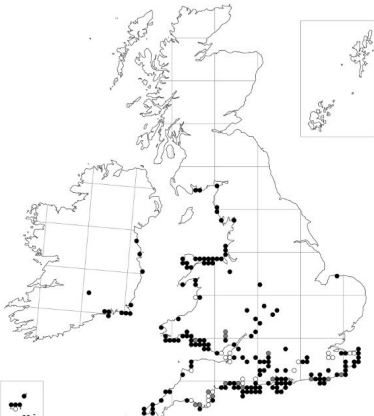
Maps are courtesy of the Bees, Wasps and Ants Recording Society and show validated records held by the society at September 2019. Black dots are for post 1990 records. Grey dots are 1960 – 1989. Open circles are pre 1960. The ranges of some species have changed considerably since the status review by Falk (1991) and the maps show that some species are now more widespread than in 1990, although their designated statuses have not been updated.

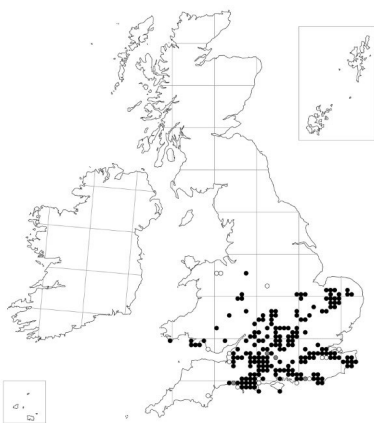
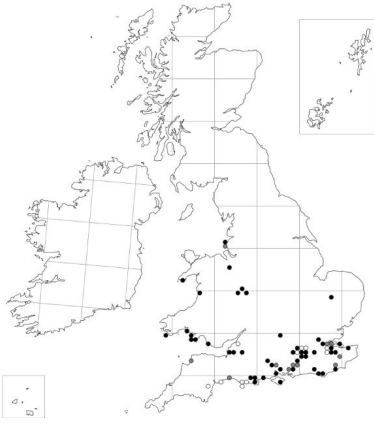
Larger maps can be viewed and downloaded at <https://www.bwars.com/content/bwars-maps-and-species-concepts>

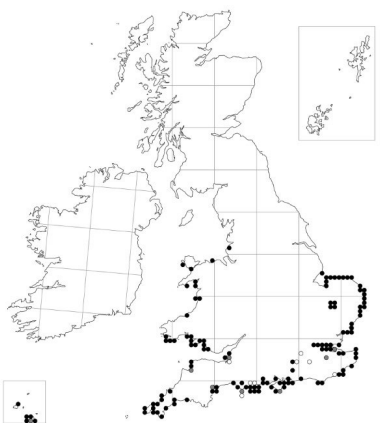
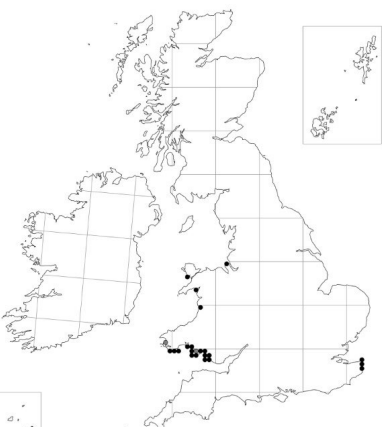
Species information	Distribution map
<u>Colletes fodiens</u> Distribution Widespread in sandy districts in southern and central England and Wales, scarcer towards the north. Status: IUCN Red-listed as Vulnerable in Europe. The populations of this species are generally in decline in western and central Europe, while in southern Europe <i>Colletes fodiens</i> is widespread but not common and populations seem to be isolated. Flight period: June – early September Pollen collected: Oligolectic on the pollen of flowers in the family Asteraceae. Especially found at ragwort (<i>Senecio jacobaea</i>). Nesting Biology: A ground nesting bee. Recorded in 2007 and 2019	
<u>Arachnospila wesmaeli</u> Distribution: Found on coastal sand dunes and dry heath land in southern England, south Wales, mid Wales, Lancashire and Cheshire. Status: Listed in Falk (1991) as Nationally Notable (Na). Flight Period: June to September. Prey Collected: <i>Lycosidae</i>, <i>Gnaphosidae</i> and <i>Salticidae</i>. (Arachnida) Not recorded in 2019. Recorded in 2007.	

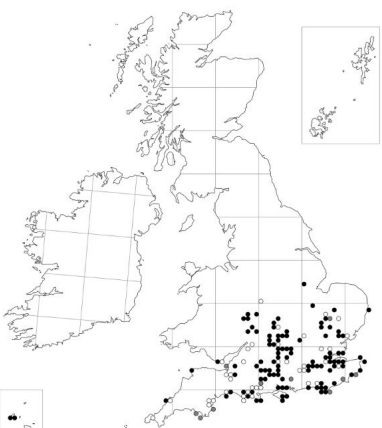
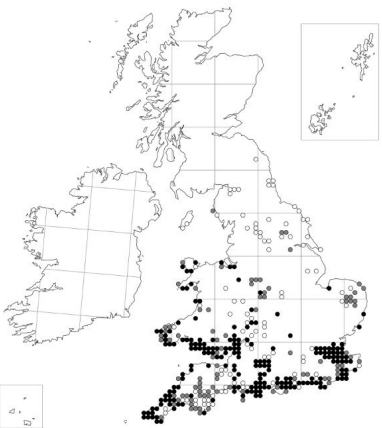
Species information	Distribution map
<i>Oxybelus argentatus</i> Distribution: This species occurs locally on coastal dunes and inland heaths in southern England and west Wales. Status: Listed in Falk (1991) as Nationally Notable (Na). Flight Period: Late June to end of August. Prey Collected: Family <i>Therevidae</i> (Diptera) Nesting Biology: Little is known of the nesting behaviour except that females provision their nests with dipterans, particularly <i>Therevidae</i> that are carried, impaled on the sting. Flowers Visited: On coastal sand dunes it frequently visits sea spurge <i>Euphorbia paralias</i> and thistle flowers. Numerous specimens recorded in 2019 Compartments 2 & 3 at SN605936, SN605938 & SN604934	
<i>Mimumesa littoralis</i> Distribution: Largely confined to coastal dune systems of the western seaboard (S.Devon, N.Devon, W.Wales to N.Lancashire). Status: Listed in Falk (1991) as Rare <i>RDB3</i>. Habitat: Most records are from coastal dunes, where it is associated with the marram zone. Flight Period: July to September. Prey Collected: Probably stocks nest cells with auchenorhynchus bugs. Nesting Biology: Has been observed nesting in sandy ground. One specimen recorded in 2019. Compartment 3 at SN605936	

Species information	Distribution map
<u>Podalonia hirsuta</u> Distribution: Along southern and western coasts from West Sussex to Lancashire. Status: Listed in Falk (1991) as Nationally Notable (Nb) Habitat: A mainly coastal species and which is common on sandy soils. Flight Period: Late March to mid September. Prey Collected: Large naked noctuid larvae (Lepidoptera). Nesting Biology: The nest burrow is dug in sand after the prey has been captured. The prey is usually hung on a tuft of grass whilst the burrow is dug. Several specimens seen. Compartments 2 & 3, including SN604939, SN605936	 A map of the United Kingdom showing the distribution of <i>Podalonia hirsuta</i>. Black dots indicate recorded locations, which are concentrated along the southern and western coasts of England, from West Sussex in the south to Lancashire in the north. There are also a few dots in Wales. An inset map shows the distribution in Ireland.
<u>Nysson dimidiatus</u> Distribution: Recorded widely but sparingly across England and Wales as far north as Yorkshire. Status: Listed in Falk (1991) as Nationally Notable (Nb). Habitat: Recorded from heathland, coastal dunes and coastal landslips. Favours sparsely vegetated or short-cropped areas on dry sandy or clayey soils. Flight Period: Univoltine; June to September. Nesting Biology: A cleptoparasite of <i>Harpactus tumidus</i> and usually occurring alongside that species. Flowers Visited: Umbellifers such as hogweed and wild carrot. Not recorded in 2019. Recorded in 2007.	 A map of the United Kingdom showing the distribution of <i>Nysson dimidiatus</i>. Black dots indicate recorded locations, which are scattered across England and Wales, from Yorkshire in the north to the south coast. There are also a few dots in Ireland. An inset map shows the distribution in Ireland.

Species information	Distribution map
<u>Dasypoda hirtipes</u> Distribution: Southern England and Wales, northwards to Merionethshire and Norfolk. Status: Listed in Falk (1991) as Nationally Notable (Nb). Habitat: Sandy soils, particularly on heath lands and coastal dunes. Flight Period: Univoltine; Late June to end of August, or early September. Pollen Collected: Oligolectic on Asteraceae; plants visited include common ragwort <i>Senecio jacobaea</i>, fleabane <i>Pulicaria dysenterica</i>, creeping thistle <i>Cirsium arvense</i>, cat-ear <i>Hypochaeris radicata</i>, hawkbit <i>Leontodon hispidus</i>, perennial sow-thistle <i>Sonchus arvensis</i> and smooth hawksbeard <i>Crepis capillaris</i>. Nesting Biology: Females excavate their nests in sandy, sparsely vegetated, level soil. Some sites contain nest aggregations of great extent. A number of specimens were recorded in 2019. All nectaring or foraging at yellow Asteracea. Compartments 2 & 3, including at SN605938, SN604936 & SN605933.	
<u>Osmia aurulenta</u> Distribution: Locally common in many coastal localities in England and Wales. Status: Listed in Falk (1991) as Nationally Notable b. Habitat: Coastal dunes, shingle ridges, landslips, disused quarries. Pollen collected: Probably polylectic in Britain; pollen collection observed from <i>Lotus corniculatus</i>. Nesting Biology: Empty snail shells. Flowers visited: <i>Glaucium flavum</i>, <i>Viola</i> sp., <i>Anthyllis vulneraria</i>, <i>Hippocrepis comosa</i>, <i>Rubus fruticosus</i> agg., <i>Rosa spinosissima</i>, <i>Salix repens</i>, <i>Armeria maritima</i>, <i>Linaria</i> sp., <i>Glechoma hederacea</i>, <i>Taraxacum officinale</i> agg. Not recorded in 2019. Recorded in 2007.	

Species information	Distribution map
<u>Osmia bicolor</u> Distribution: Distributed predominantly in southern England and south Wales, the range being closely correlated with chalk and limestone soils. Habitat: A strongly calcareous species. In southern England the species is often found on coastal dunes (Else & Edwards, 2018) Status: Listed in Falk (1991) as Nationally Notable (Nb) Nesting Biology: Empty snail shells. Flowers visited: In Britain the females have a strong preference for <i>Anthyllis vulnerata</i>, <i>Lotus corniculatus</i> and <i>Hippocrepis comosa</i>. A single female was recorded in 2019. Compartment 3 at SN604935.	
<u>Stelis ornatula</u> Distribution: Widely distributed in southern England and East Anglia, Wales and in Merseyside (south Lancashire). Status: Listed in Falk (1991) as Rare, <i>RDB</i> 3. Flight Period: Univoltine; end of May to late August. Nesting Biology: A cleptoparasite of <i>Hoplitis claviventris</i>. <i>S. ornatula</i> has been reared from bramble, rose and ragwort stem nests. Flowers Visited: Birds-foot-trefoil <i>Lotus corniculatus</i>, cinquefoil species, ragwort <i>Senecio jacobaea</i>, fleabane <i>Pulicaria dysenterica</i> and hawksbeard species. Not recorded in 2019 (recorded in 2007)	

Species information	Distribution map
<u>Megachile leachella</u> (formerly <i>M. dorsalis</i>) Distribution: Principally restricted to coastal sites in south and southeast England and south and west Wales. Status: Listed in Falk (1991) as Nationally Notable (Nb). Habitat: Closely associated wind blown sands of coastal dunes, where it normally frequents the mid dunes and requires warm, sunny areas such as south-facing slopes and sheltered slacks for nesting. Flight Period: June to late August. Nesting Biology: Female <i>M. dorsalis</i> excavate their nest burrows in sandy soil and construct their nest cells from leaf sections cut from various plants. Pollen Collected: Pollen sources have not been established. <i>M. dorsalis</i> visits a wide variety of plants. Abundant in some locations in 2019. Compartments 2 & 3 including at SN604938, SN605938, SN605936 (nesting aggregation), SN605935(nesting aggregation), SN604934 & SN605931.	
<u>Coelioxys mandibularis</u> Distribution: A coastal species with records confined to three discontinuous areas of Britain: Merseyside and Wallasey area of S. Lancashire and Cheshire; south and west Wales and W. Sussex and E. Kent in south-east England. Status: Listed in Falk (1991) as Rare <i>RDB</i> 3. Habitat: In Britain it is recorded exclusively from coastal sand dunes. Flight Period: Univoltine; June to late August. Nesting Biology: A cleptoparasite of bees in the genus <i>Megachile</i>. Not recorded in 2019 (recorded in 2007)	

Species information	Distribution map
<u>Lasioglossum xanthopus</u> Distribution: Very local but widely distributed in southern Britain, the range extending northwards to Nottinghamshire (Carr, 1935) and South Lincolnshire. In Wales, known only from Glamorgan. Also reported from Guernsey and the Channel Islands. Status: Listed in Falk (1991) as Notable B. Habitat: Mainly encountered on calcareous grassland, coastal landslips and cliffs. Flight Period: Females are active from early April to at least August. Males from August to mid October. Nesting Biology: Poorly understood, but “generally in grassy places” (Else & Edwards, 2018). A single female was caught in a pantrap in 2019. Compartment 2 at SN60829443.	
<u>Bombus humilis</u> Distribution: Intermittently present along the southern and western coasts of England and Wales, reaching furthest north on the Llyn Peninsula and Anglesey. There are a few inland populations, most notably on Salisbury Plain, Wiltshire. In common with other bumblebees, relatively large areas of suitable habitat, in the order of ten square kilometres, are required to maintain viable populations. Status: BAP Priority species, now known as Section 41 species. Habitat: Strongly associated with areas of tall, but open, grasslands supporting a good proportion of perennial plants, especially those in the families Fabaceae, Lamiaceae and Scrophulariaceae. Nesting biology: B. humilis queens found nests on the surface of the ground in moderately tall, open grassland. Flowers visited: Will forage for nectar at a variety of plants, including yellow Asteraceae. Not recorded in 2019. Not recorded in 2007.	

Appendix 5. Insects recorded from Ynyslas Dunes in 2019.

Taxon	Species	Grid Ref	Date	Abundance	Sex
Aculeata	<i>Ammophila sabulosa</i>	SN604939	16/07/2019	-	m
Aculeata	<i>Ammophila sabulosa</i>	SN6093	02/08/2019	1	f
Aculeata	<i>Ancistrocerus oviventris</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Ancistrocerus oviventris</i>	SN6094	20/06/2019	-	-

Taxon	Species	Grid Ref	Date	Abundance	Sex
Aculeata	<i>Ancistrocerus scoticus</i>	SN6094	20/06/2019	1	f
Aculeata	<i>Ancistrocerus scoticus</i>	SN6093	02/08/2019	2	m&f
Aculeata	<i>Andrena barbilabris</i>	SN610938	04/05/2019	numbers	m & f
Aculeata	<i>Andrena barbilabris</i>	SN6093	04/05/2019	numbers	f
Aculeata	<i>Andrena barbilabris</i>	SN6094	04/05/2019	numbers	m & f
Aculeata	<i>Andrena barbilabris</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Andrena barbilabris</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Andrena barbilabris</i>	SN6093	19/05/2019	2	m
Aculeata	<i>Andrena barbilabris</i>	SN6094	19/05/2019	1	f
Aculeata	<i>Andrena barbilabris</i>	SN6094	20/06/2019	2	m&f
Aculeata	<i>Andrena barbilabris</i>	SN605938	16/07/2019	1	f
Aculeata	<i>Andrena barbilabris</i>	SN6193	02/08/2019	-	-
Aculeata	<i>Andrena barbilabris</i>	SN6094	02/08/2019	-	f
Aculeata	<i>Andrena bimaculata</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Andrena cineraria</i>	SN60579411	04/05/2019	1	m
Aculeata	<i>Andrena flavipes</i>	SN6093	02/08/2019	-	-
Aculeata	<i>Andrena haemorrhoa</i>	SN610938	04/05/2019	1	f
Aculeata	<i>Andrena haemorrhoa</i>	SN6093	19/05/2019	2	m
Aculeata	<i>Anoplius infuscatus</i>	SN6193	20/06/2019	-	-
Aculeata	<i>Anoplius infuscatus</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Anoplius infuscatus</i>	SN6193	20/06/2019	-	-
Aculeata	<i>Anoplius infuscatus</i>	SN6094	20/06/2019	2	f
Aculeata	<i>Anoplius infuscatus</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Anoplius nigerrimus</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Anoplius nigerrimus</i>	SN6193	02/08/2019	-	-
Aculeata	<i>Bombus jonellus</i>	SN610940	04/05/2019	several	q & w
Aculeata	<i>Bombus jonellus</i>	SN606940	04/05/2019	few	w
Aculeata	<i>Bombus jonellus</i>	SN606935	04/05/2019	few	w
Aculeata	<i>Bombus jonellus</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Bombus jonellus</i>	SN6193	20/06/2019	-	-
Aculeata	<i>Bombus lapidarius</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Bombus lucorum agg.</i>	SN6093	04/05/2019	1	q
Aculeata	<i>Bombus pascuorum</i>	SN6193	20/06/2019	-	-
Aculeata	<i>Bombus terrestris</i>	SN609940	04/05/2019	2	q
Aculeata	<i>Bombus terrestris</i>	SN6193	20/06/2019	-	-
Aculeata	<i>Cerceris arenaria</i>	SN605938	16/07/2019	1	m
Aculeata	<i>Cerceris arenaria</i>	SN6094	16/07/2019	numerous	m & f
Aculeata	<i>Cerceris arenaria</i>	SN605936	16/07/2019	-	-
Aculeata	<i>Cerceris arenaria</i>	SN605933	16/07/2019	-	-
Aculeata	<i>Cerceris arenaria</i>	SN604934	16/07/2019	-	m
Aculeata	<i>Cerceris arenaria</i>	SN6093	02/08/2019	-	-
Aculeata	<i>Cerceris arenaria</i>	SN6093	02/08/2019	-	-
Aculeata	<i>Cerceris arenaria</i>	SN6093	02/08/2019	1	f
Aculeata	<i>Cerceris arenaria</i>	SN605931	02/08/2019	-	-
Aculeata	<i>Chrysis impressa</i>	SN6093	19/05/2019	2	m & f

Taxon	Species	Grid Ref	Date	Abundance	Sex
Aculeata	<i>Chrysis terminata</i>	SN6093	19/05/2019	1	m
Aculeata	<i>Coelioxys conoidea</i>	SN6094	16/07/2019	4	m & f
Aculeata	<i>Coelioxys conoidea</i>	SN608944	02/08/2019	1	f
Aculeata	<i>Coelioxys elongata</i>	SN605937	20/06/2019	1	m
Aculeata	<i>Coelioxys inermis</i>	SN6094	16/07/2019	1	m
Aculeata	<i>Coelioxys sp.</i>	SN6094	20/06/2019	1	m
Aculeata	<i>Colletes cunicularius</i>	SN610938	04/05/2019	1	f
Aculeata	<i>Colletes cunicularius</i>	SN6094	19/05/2019	-	-
Aculeata	<i>Colletes fodiens</i>	SN6094	16/07/2019	1	f
Aculeata	<i>Colletes fodiens</i>	SN6093	02/08/2019	2	m
Aculeata	<i>Colletes fodiens</i>	SN607943	02/08/2019	-	-
Aculeata	<i>Colletes fodiens</i>	SN6093	02/08/2019	-	m & f
Aculeata	<i>Colletes fodiens</i>	SN6094	02/08/2019	2	m & f
Aculeata	<i>Colletes fodiens</i>	SN6094	02/08/2019	several	m & f
Aculeata	<i>Colletes similis</i>	SN6094	16/07/2019	2	f
Aculeata	<i>Colletes similis</i>	SN6093	02/08/2019	1	f
Aculeata	<i>Crabro cribrarius</i>	SN604934	16/07/2019	-	f
Aculeata	<i>Crossocerus wesmaeli</i>	SN6193	20/06/2019	2	f
Aculeata	<i>Crossocerus wesmaeli</i>	SN60829443	20/06/2019	1	m
Aculeata	<i>Crossocerus wesmaeli</i>	SN6093	19/05/2019	3	m&f
Aculeata	<i>Crossocerus wesmaeli</i>	SN6193	20/06/2019	1	m
Aculeata	<i>Crossocerus wesmaeli</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Crossocerus wesmaeli</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Crossocerus wesmaeli</i>	SN605936	20/06/2019	6	m & f
Aculeata	<i>Crossocerus wesmaeli</i>	SN604934	16/07/2019	-	m
Aculeata	<i>Crossocerus wesmaeli</i>	SN608944	02/08/2019	-	-
Aculeata	<i>Dasypoda hirtipes</i>	SN605938	16/07/2019	1	m
Aculeata	<i>Dasypoda hirtipes</i>	SN604936	16/07/2019	-	
Aculeata	<i>Dasypoda hirtipes</i>	SN6093	02/08/2019	1	f
Aculeata	<i>Dasypoda hirtipes</i>	SN605933	02/08/2019	1	m
Aculeata	<i>Epeolus variegatus</i>	SN6094	16/07/2019	1	f
Aculeata	<i>Epeolus variegatus</i>	SN605936	16/07/2019	-	-
Aculeata	<i>Epeolus variegatus</i>	SN604934	16/07/2019	-	f
Aculeata	<i>Epeolus variegatus</i>	SN6093	02/08/2019	several	m&f
Aculeata	<i>Episyron rufipes</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Episyron rufipes</i>	SN6094	20/06/2019	1	m
Aculeata	<i>Episyron rufipes</i>	SN604938	16/07/2019	1	-
Aculeata	<i>Episyron rufipes</i>	SN605938	16/07/2019	1	-
Aculeata	<i>Episyron rufipes</i>	SN6094	16/07/2019	-	-
Aculeata	<i>Episyron rufipes</i>	SN604934	16/07/2019	-	f
Aculeata	<i>Episyron rufipes</i>	SN6093	02/08/2019	several	f
Aculeata	<i>Episyron rufipes</i>	SN605937	02/08/2019	1	-
Aculeata	<i>Halictus rubicundus</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Hedychridium ardens</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Hedychridium ardens</i>	SN605936	20/06/2019	-	-

Taxon	Species	Grid Ref	Date	Abundance	Sex
Aculeata	<i>Hedychridium ardens</i>	SN605936	20/06/2019	-	-
Aculeata	<i>Hedychridium ardens</i>	SN604938	16/07/2019	1	-
Aculeata	<i>Hylaeus brevicornis</i>	SN6094	16/07/2019	2	f
Aculeata	<i>Hylaeus brevicornis</i>	SN604934	16/07/2019	-	f
Aculeata	<i>Hylaeus communis</i>	SN6093	02/08/2019	-	-
Aculeata	<i>Hylaeus hyalinatus</i>	SN6193	20/06/2019	1	f
Aculeata	<i>Lasioglossum leucozonium</i>	SN6093	20/06/2019	1	f
Aculeata	<i>Lasioglossum villosulum</i>	SN60829443	20/06/2019	1	f
Aculeata	<i>Lasioglossum villosulum</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Lasioglossum villosulum</i>	SN6094	20/06/2019	-	f
Aculeata	<i>Lasioglossum xanthopus</i>	SN60829443	20/06/2019	1	f
Aculeata	<i>Lasius flavus</i>	SN604934	16/07/2019	-	m
Aculeata	<i>Lasius niger</i>	SN604934	16/07/2019	-	m
Aculeata	<i>Megachile leachella</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Megachile leachella</i>	SN6094	20/06/2019	-	m
Aculeata	<i>Megachile leachella</i>	SN604938	16/07/2019	-	m
Aculeata	<i>Megachile leachella</i>	SN605938	16/07/2019	1	m
Aculeata	<i>Megachile leachella</i>	SN605936	16/07/2019	-	m & f
Aculeata	<i>Megachile leachella</i>	SN605935	16/07/2019	3	m & f
Aculeata	<i>Megachile leachella</i>	SN605936	16/07/2019	-	-
Aculeata	<i>Megachile leachella</i>	SN604934	16/07/2019	-	m & f
Aculeata	<i>Megachile leachella</i>	SN6093	02/08/2019	several	m & f
Aculeata	<i>Megachile leachella</i>	SN605935	02/08/2019	-	m & f
Aculeata	<i>Megachile leachella</i>	SN605931	02/08/2019	-	-
Aculeata	<i>Megachile leachella</i>	SN605935	02/08/2019	-	-
Aculeata	<i>Megachile leachella</i>	SN6094	02/08/2019	several	m & f
Aculeata	<i>Megachile maritima</i>	SN6093	02/08/2019	1	f
Aculeata	<i>Megachile maritima</i>	SN6094	16/07/2019	1	f
Aculeata	<i>Mellinus arvensis</i>	SN6093	02/08/2019	-	-
Aculeata	<i>Mimumesa littoralis</i>	SN6094	16/07/2019	1	f
Aculeata	<i>Nomada goodeniana</i>	SN6094	19/05/2019	1	f
Aculeata	<i>Nomada ruficornis</i>	SN610938	04/05/2019	1	m
Aculeata	<i>Nomada ruficornis</i>	SN6093	19/05/2019	1	m
Aculeata	<i>Osmia bicolor</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Osmia bicornis</i>	SN6193	19/05/2019	-	-
Aculeata	<i>Oxybelus argentatus</i>	SN6093	20/06/2019	2	m & f
Aculeata	<i>Oxybelus argentatus</i>	SN6094	20/06/2019	1	f
Aculeata	<i>Oxybelus argentatus</i>	SN605936	20/06/2019	2	m & f
Aculeata	<i>Oxybelus argentatus</i>	SN605938	16/07/2019	2	m & f
Aculeata	<i>Oxybelus argentatus</i>	SN6094	16/07/2019	1	m
Aculeata	<i>Oxybelus argentatus</i>	SN604934	16/07/2019	-	f
Aculeata	<i>Oxybelus argentatus</i>	SN6094	02/08/2019	1	f
Aculeata	<i>Oxybelus uniglumis</i>	SN60829443	20/06/2019	23	m & f
Aculeata	<i>Oxybelus uniglumis</i>	SN6093	20/06/2019	3	f
Aculeata	<i>Oxybelus uniglumis</i>	SN6093	20/06/2019	-	f

Taxon	Species	Grid Ref	Date	Abundance	Sex
Aculeata	<i>Oxybelus uniglumis</i>	SN6094	19/05/2019	10	m & f
Aculeata	<i>Oxybelus uniglumis</i>	SN6193	20/06/2019	1	-
Aculeata	<i>Oxybelus uniglumis</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Oxybelus uniglumis</i>	SN605936	20/06/2019	-	-
Aculeata	<i>Oxybelus uniglumis</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Oxybelus uniglumis</i>	SN605936	20/06/2019	11	m & f
Aculeata	<i>Oxybelus uniglumis</i>	SN604938	16/07/2019	-	-
Aculeata	<i>Oxybelus uniglumis</i>	SN605938	16/07/2019	8	f
Aculeata	<i>Oxybelus uniglumis</i>	SN6094	16/07/2019	numbers	m & f
Aculeata	<i>Oxybelus uniglumis</i>	SN605936	16/07/2019	-	f
Aculeata	<i>Oxybelus uniglumis</i>	SN605935	16/07/2019	1	f
Aculeata	<i>Oxybelus uniglumis</i>	SN6093	02/08/2019	-	-
Aculeata	<i>Oxybelus uniglumis</i>	SN608944	02/08/2019	-	-
Aculeata	<i>Oxybelus uniglumis</i>	SN6093	02/08/2019	-	-
Aculeata	<i>Oxybelus uniglumis</i>	SN608944	02/08/2019	2	f
Aculeata	<i>Oxybelus uniglumis</i>	SN605937	02/08/2019	4	-
Aculeata	<i>Oxybelus uniglumis</i>	SN6094	02/08/2019	-	m & f
Aculeata	<i>Pemphredon lethifer</i>	SN6094	16/07/2019	1	f
Aculeata	<i>Pemphredon lethifer</i>	SN6093	02/08/2019	1	f
Aculeata	<i>Pemphredon lethifer</i>	SN6094	02/08/2019	1	m & f
Aculeata	<i>Podalonia hirsuta</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Podalonia hirsuta</i>	SN608944	19/05/2019	1	m
Aculeata	<i>Podalonia hirsuta</i>	SN6093	20/06/2019	1	f
Aculeata	<i>Podalonia hirsuta</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Podalonia hirsuta</i>	SN6094	20/06/2019	1	f
Aculeata	<i>Podalonia hirsuta</i>	SN6093	16/07/2019	-	-
Aculeata	<i>Podalonia hirsuta</i>	SN604939	16/07/2019	-	-
Aculeata	<i>Podalonia hirsuta</i>	SN605936	16/07/2019	-	-
Aculeata	<i>Podalonia hirsuta</i>	SN6094	02/08/2019	1	f
Aculeata	<i>Pompilus cinereus</i>	SN6094	20/06/2019	several	m & f
Aculeata	<i>Pompilus cinereus</i>	SN604934	16/07/2019	-	m & f
Aculeata	<i>Pompilus cinereus</i>	SN6093	02/08/2019	several	f
Aculeata	<i>Pompilus cinereus</i>	SN6193	20/06/2019	1	f
Aculeata	<i>Pompilus cinereus</i>	SN605936	20/06/2019	1	f
Aculeata	<i>Pompilus cinereus</i>	SN605938	16/07/2019	2	-
Aculeata	<i>Pompilus cinereus</i>	SN6094	16/07/2019	numbers	-
Aculeata	<i>Pompilus cinereus</i>	SN605933	16/07/2019	-	-
Aculeata	<i>Sphecodes pellucidus</i>	SN6193	19/05/2019	1	f
Aculeata	<i>Sphecodes pellucidus</i>	SN6093	19/05/2019	-	-
Aculeata	<i>Sphecodes pellucidus</i>	SN6094	20/06/2019	-	-
Aculeata	<i>Sphecodes pellucidus</i>	SN6094	20/06/2019	1	f
Aculeata	<i>Tachysphex pompiliformis</i>	SN6193	20/06/2019	-	-
Aculeata	<i>Tachysphex pompiliformis</i>	SN6094	20/06/2019	2	f
Aculeata	<i>Tachysphex pompiliformis</i>	SN605936	20/06/2019	1	f
Aculeata	<i>Tachysphex pompiliformis</i>	SN604938	16/07/2019	1	m

Taxon	Species	Grid Ref	Date	Abundance	Sex
Perilampidae	<i>Perilampus aureoviridis</i>	SN6093	20/06/2019	1	f
Perilampidae	<i>Perilampus aureoviridis</i>	SN6093	16/07/2019	3	f
Perilampidae	<i>Perilampus laevifrons</i>	SN6093	16/07/2019	1	m
Anthomyiidae	<i>Anthomyia procellaris</i>	SN6193	20/06/2019	1	m
Anthomyiidae	<i>Anthomyia procellaris</i>	SN6193	20/06/2019	1	m
Anthomyiidae	<i>Delia albula</i>	SN6093	04/05/2019	abundant	m & f
Anthomyiidae	<i>Delia albula</i>	SN6094	20/06/2019	1	f
Anthomyiidae	<i>Delia albula</i>	SN6193	20/06/2019	2	f
Anthomyiidae	<i>Delia albula</i>	SN605936	20/06/2019	2	m & f
Anthomyiidae	<i>Delia albula</i>	SN6093	02/08/2019	-	m
Anthomyiidae	<i>Delia frontella</i>	SN6093	04/05/2019	-	m
Anthomyiidae	<i>Delia frontella</i>	SN6093	20/06/2019	1	m
Anthomyiidae	<i>Delia pallipennis</i>	SN6093	20/06/2019	1	m
Anthomyiidae	<i>Delia penicillosa</i>	SN6193	20/06/2019	2	m
Anthomyiidae	<i>Delia penicillosa</i>	SN6093	20/06/2019	2	m
Anthomyiidae	<i>Delia platyura</i>	SN60829443	20/06/2019	-	m
Asilidae	<i>Dialineura anilis</i>	SN6093	20/06/2019	2	m
Asilidae	<i>Dioctria rufipes</i>	SN6093	19/05/2019	-	-
Asilidae	<i>Dioctria rufipes</i>	SN6093	02/08/2019	-	-
Asilidae	<i>Dioctria rufipes</i>	SN6094	02/08/2019	-	-
Asilidae	<i>Dysmachus trigonus</i>	SN6094	19/05/2019	several	-
Asilidae	<i>Dysmachus trigonus</i>	SN6093	19/05/2019	-	-
Asilidae	<i>Philonicus albiceps</i>	SN6193	02/08/2019	-	-
Asilidae	<i>Philonicus albiceps</i>	SN6094	20/06/2019	-	-
Asilidae	<i>Philonicus albiceps</i>	SN6094	20/06/2019	-	-
Bibionidae	<i>Dilophus febrilis</i>	SN6094	02/08/2019	-	-
Bombyliidae	<i>Phthiria pulicaria</i>	SN6093	20/06/2019	2	-
Bombyliidae	<i>Phthiria pulicaria</i>	SN6094	20/06/2019	-	-
Bombyliidae	<i>Phthiria pulicaria</i>	SN6094	20/06/2019	numbers	-
Bombyliidae	<i>Phthiria pulicaria</i>	SN605936	20/06/2019	4	-
Bombyliidae	<i>Phthiria pulicaria</i>	SN604938	16/07/2019	1	-
Bombyliidae	<i>Phthiria pulicaria</i>	SN605933	02/08/2019	1	-
Calliphoridae	<i>Pollenia amentaria</i>	SN6093	02/08/2019	-	-
Canacidae	<i>Tethina albasetulosa</i>	SN6093	19/05/2019	1	-
Canacidae	<i>Tethina albasetulosa</i>	SN6093	20/06/2019	2	m
Canacidae	<i>Tethina albasetulosa</i>	SN6093	02/08/2019	-	m & f
Canacidae	<i>Tethina albasetulosa</i>	SN6094	02/08/2019	2	m & f
Canacidae	<i>Tethina illota</i>	SN60829443	20/06/2019	76	m & f
Canacidae	<i>Tethina illota</i>	SN6094	20/06/2019	1	-
Canacidae	<i>Tethina illota</i>	SN605936	20/06/2019	7	m & f
Canacidae	<i>Tethina illota</i>	SN605938	16/07/2019	numerous	m & f
Canacidae	<i>Tethina illota</i>	SN605935	16/07/2019	abundant	m & f
Canacidae	<i>Tethina illota</i>	SN6093	02/08/2019	-	m & f
Canacidae	<i>Tethina illota</i>	SN608944	02/08/2019	-	m & f
Canacidae	<i>Tethina illota</i>	SN6094	02/08/2019	several	m & f

Taxon	Species	Grid Ref	Date	Abundance	Sex
Chamaemyiidae	<i>Chamaemyia aridella</i>	SN6193	20/06/2019	1	f
Chamaemyiidae	<i>Chamaemyia aridella</i>	SN6094	02/08/2019	-	m
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6093	19/05/2019	numbers	m & f
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6193	20/06/2019	4	m & f
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6093	20/06/2019	2	m
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6094	20/06/2019	1	f
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6193	20/06/2019	-	m
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6094	16/07/2019	-	m
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6093	02/08/2019	-	m & f
Chamaemyiidae	<i>Chamaemyia flavipalpis</i>	SN6094	02/08/2019	-	f
Chamaemyiidae	<i>Chamaemyia herbarum</i>	SN6193	20/06/2019	abundant	m & f
Chamaemyiidae	<i>Chamaemyia herbarum</i>	SN6093	20/06/2019	numbers	m
Chamaemyiidae	<i>Chamaemyia herbarum</i>	SN6193	20/06/2019	-	m & f
Chamaemyiidae	<i>Chamaemyia herbarum</i>	SN6094	16/07/2019	-	m & f
Chamaemyiidae	<i>Chamaemyia herbarum</i>	SN6093	02/08/2019	1	f
Chamaemyiidae	<i>Chamaemyia herbarum</i>	SN6094	02/08/2019	-	m & f
Chamaemyiidae	<i>Chamaemyia juncorum</i>	SN6093	20/06/2019	5	m & f
Chloropidae	<i>Meromyza pratorum</i>	SN6093	20/06/2019	1	f
Chloropidae	<i>Meromyza pratorum</i>	SN6094	16/07/2019	-	-
Chloropidae	<i>Meromyza pratorum</i>	SN6093	02/08/2019	-	m & f
Chloropidae	<i>Meromyza pratorum</i>	SN6094	02/08/2019	-	m & f
Coleoptera	<i>Chrysolina polita</i>	SN610938	04/05/2019	abundant	-
Coleoptera	<i>Chrysomela staphylea</i>	SN6193	04/05/2019	1	-
Coleoptera	<i>Psylliodes marcida</i>	SN6094	02/08/2019	-	-
Conopidae	<i>Sicus ferrugineus</i>	SN6093	02/08/2019	-	-
Diastatidae	<i>Diastata adusta</i>	SN6193	19/05/2019	-	-
Dolichopodidae	<i>Chrysotimus molliculus</i>	SN6193	20/06/2019	1	m
Dolichopodidae	<i>Chrysotus cilipes</i>	SN6094	16/07/2019	several	m
Dolichopodidae	<i>Chrysotus gramineus</i>	SN6094	16/07/2019	several	m
Dolichopodidae	<i>Chrysotus laesus</i>	SN6094	16/07/2019	-	m
Dolichopodidae	<i>Dolichopus linearis</i>	SN6193	20/06/2019	-	m
Dolichopodidae	<i>Dolichopus notatus</i>	SN6193	20/06/2019	1	m
Dolichopodidae	<i>Dolichopus plumipes</i>	SN6193	20/06/2019	1	m
Dolichopodidae	<i>Dolichopus simplex</i>	SN6193	20/06/2019	abundant	m & f
Dolichopodidae	<i>Dolichopus simplex</i>	SN60829443	20/06/2019	1	f
Dolichopodidae	<i>Gymnopternus aerosus</i>	SN6193	20/06/2019	1	m
Dolichopodidae	<i>Hercostomus nigripennis</i>	SN6193	20/06/2019	2	m & f
Dolichopodidae	<i>Hercostomus germanus</i>	SN6094	16/07/2019	-	m
Dolichopodidae	<i>Hercostomus nigripennis</i>	SN6193	20/06/2019	1	m
Dolichopodidae	<i>Hercostomus nigriplantis</i>	SN6094	16/07/2019	-	m
Dolichopodidae	<i>Machaerium maritimae</i>	SN6093	20/06/2019	1	m
Dolichopodidae	<i>Medetera saxatilis</i>	SN6094	20/06/2019	1	m
Dolichopodidae	<i>Sciapus wiedemanni</i>	SN6193	20/06/2019	1	f
Dolichopodidae	<i>Sympycnus desoutteri</i>	SN6193	20/06/2019	several	m
Dolichopodidae	<i>Sympycnus desoutteri</i>	SN6094	16/07/2019	-	-

Taxon	Species	Grid Ref	Date	Abundance	Sex
Dolichopodidae	<i>Sympycnus desoutteri</i>	SN6094	02/08/2019	-	m
Dolichopodidae	<i>Xanthochlorus ornatus</i>	SN6193	20/06/2019	1	f
Drosophilidae	<i>Scaptomyza pallida</i>	SN6094	02/08/2019	-	
Empididae	<i>empis aestiva</i>	SN6093	19/05/2019	1	m
Empididae	<i>Empis livida</i>	SN6193	20/06/2019	-	-
Empididae	<i>Empis nuntia</i>	SN6193	19/05/2019	-	-
Empididae	<i>Hilara cantabrica</i>	SN6093	19/05/2019	1	m
Empididae	<i>Hilara cantabrica</i>	SN6094	16/07/2019	-	-
Empididae	<i>Hilara chorica</i>	SN6193	20/06/2019	1	m
Empididae	<i>Hilara fulvibarba</i>	SN6193	20/06/2019	1	m
Empididae	<i>Rhamphomyia variabilis</i>	SN6093	02/08/2019	-	m & f
Heteroptera	<i>Aelia acuminata</i>	SN6094	16/07/2019	-	-
Heteroptera	<i>Corizus hyoscyami</i>	SN605933	16/07/2019	-	-
Homoptera	<i>Cercopis vulnerata</i>	SN6193	02/08/2019	-	-
Hybotidae	<i>Hybos culiciformis</i>	SN6094	16/07/2019	-	-
Lauxaniidae	<i>Minettia fasciata</i>	SN6094	02/08/2019	-	-
Lauxaniidae	<i>Minettia longiseta</i>	SN6193	20/06/2019	3	m & f
Lauxaniidae	<i>Sapromyza quadripunctata</i>	SN6193	20/06/2019	1	f
Lauxaniidae	<i>Sapromyza quadripunctata</i>	SN6193	20/06/2019	1	m
Lauxaniidae	<i>Sapromyza quadripunctata</i>	SN6193	20/06/2019	2	f
Lepidoptera	<i>Argynnis aglaja</i>	SN604934	16/07/2019	-	--
Lepidoptera	<i>Lasiocampa quercus</i>	SN6193	04/05/2019	1	
Lepidoptera	<i>Malacosoma neustria</i>	SN6193	04/05/2019	many	larvae
Lepidoptera	<i>Maniola jurtina</i>	SN604934	16/07/2019	-	-
Lepidoptera	<i>Phragmatobia fuliginosa</i>	SN610940	04/05/2019	1	-
Lepidoptera	<i>Pyronia tithonus</i>	SN604934	16/07/2019	-	-
Lepidoptera	<i>Thymelicus sylvestris</i>	SN604934	16/07/2019	-	-
Lepidoptera	<i>Tyria jacobaeae</i>	SN609940	04/05/2019	1	-
Lepidoptera	<i>Vanessa cardui</i>	SN604934	16/07/2019	-	-
Lonchaeidae	<i>Lonchaea scutellaris</i>	SN6193	20/06/2019	1	m
Muscidae	<i>Coenosia femoralis</i>	SN6193	20/06/2019	1	m
Muscidae	<i>Coenosia femoralis</i>	SN6094	16/07/2019	2	m
Muscidae	<i>Coenosia mollicula</i>	SN6093	02/08/2019	-	m
Muscidae	<i>Coenosia pumila</i>	SN6193	20/06/2019	2	m
Muscidae	<i>Coenosia testacea</i>	SN6093	19/05/2019	-	f
Muscidae	<i>Coenosia tigrina</i>	SN6094	02/08/2019	-	-
Muscidae	<i>Helina protuberans</i>	SN6093	04/05/2019	abundant	m & f
Muscidae	<i>Helina protuberans</i>	SN6193	19/05/2019	-	-
Muscidae	<i>Helina protuberans</i>	SN6093	20/06/2019	1	f
Muscidae	<i>Phaonia perdita</i>	SN6193	19/05/2019	-	-
Muscidae	<i>Phaonia serva</i>	SN6093	04/05/2019	abundant	m & f
Muscidae	<i>Pseudocoenosia abnormis</i>	SN6093	02/08/2019	-	-
Muscidae	<i>Schoenomyza litorella</i>	SN6093	19/05/2019	-	-
Muscidae	<i>Schoenomyza litorella</i>	SN6094	16/07/2019	-	-
Muscidae	<i>Schoenomyza litorella</i>	SN6094	02/08/2019	1	f

Taxon	Species	Grid Ref	Date	Abundance	Sex
Muscidae	<i>Villeneuveia aestuum</i>	SN6093	20/06/2019	1	m
Orthoptera	<i>Chorthippus brunneus</i>	SN604934	16/07/2019	-	m
Orthoptera	<i>Myrmeleotettix maculatus</i>	SN604934	16/07/2019	-	m
Orthoptera	<i>Omocestus viridulus</i>	SN604934	16/07/2019	-	m
Pipunculidae	<i>Dorylomorpha xanthopus</i>	SN6093	20/06/2019	1	m
Pipunculidae	<i>Eudorylas obscurus</i>	SN6094	16/07/2019	1	f
Pipunculidae	<i>Eudorylas obscurus</i>	SN6093	20/06/2019	1	m
Pipunculidae	<i>Eudorylas obscurus</i>	SN6094	16/07/2019	1	m
Pipunculidae	<i>Jassidophaga beatricis</i>	SN6193	20/06/2019	1	f
Pipunculidae	<i>Tomosvaryella littoralis</i>	SN605938	16/07/2019	3	m
Pipunculidae	<i>Tomosvaryella littoralis</i>	SN605937	02/08/2019	2	m
Pipunculidae	<i>Verrallia aucta</i>	SN6193	20/06/2019	1	f
Platystomatidae	<i>Rivellia syngenesiae</i>	SN6093	20/06/2019	-	-
Psilidae	<i>Chamaepsila nigra</i>	SN6093	19/05/2019	1	f
Rhagionidae	<i>Chloromyia formosa</i>	SN605935	02/08/2019	-	-
Rhagionidae	<i>Chrysopilus cristatus</i>	SN6193	20/06/2019	several	-
Rhagionidae	<i>Chrysopilus cristatus</i>	SN6094	02/08/2019	-	-
Rhagionidae	<i>Chrysopilus cristatus</i>	SN6094	16/07/2019	-	-
Rhinophoridae	<i>Rhinophora lepida</i>	SN604938	16/07/2019	numerous	-
Rhinophoridae	<i>Rhinophora lepida</i>	SN6094	16/07/2019	numbers	m & f
Rhinophoridae	<i>Rhinophora lepida</i>	SN605935	16/07/2019	numerous	m & f
Rhinophoridae	<i>Rhinophora lepida</i>	SN6093	02/08/2019	-	m & f
Rhinophoridae	<i>Rhinophora lepida</i>	SN6094	02/08/2019	-	-
Rhinophoridae	<i>Rhinophora lepida</i>	SN605933	02/08/2019	-	-
Rhinophoridae	<i>Rhinophora lepida</i>	SN605935	02/08/2019	-	-
Rhinophoridae	<i>Rhinophora lepida</i>	SN605937	02/08/2019	numerous	-
Sarcophagidae	<i>Sarcophaga filia</i>	SN6093	19/05/2019	1	m
Sarcophagidae	<i>Sarcophaga filia</i>	SN605936	20/06/2019	1	m
Sarcophagidae	<i>Sarcophaga filia</i>	SN605938	16/07/2019	1	m
Sarcophagidae	<i>Sarcophaga filia</i>	SN6094	16/07/2019	-	-
Sarcophagidae	<i>Sarcophaga filia</i>	SN6094	16/07/2019	-	-
Sarcophagidae	<i>Sarcophaga filia</i>	SN6093	02/08/2019	5	m
Sarcophagidae	<i>Sarcophaga nigriventris</i>	SN6193	04/05/2019	-	m
Sarcophagidae	<i>Sarcophaga nigriventris</i>	SN6193	19/05/2019	-	-
Sarcophagidae	<i>Sarcophaga nigriventris</i>	SN6093	20/06/2019	1	m
Sarcophagidae	<i>Sarcophaga nigriventris</i>	SN6094	20/06/2019	5	m
Sarcophagidae	<i>Sarcophaga nigriventris</i>	SN605938	16/07/2019	1	m
Sarcophagidae	<i>Sarcophaga nigriventris</i>	SN6093	02/08/2019	5	m
Sarcophagidae	<i>Sarcophaga teretirostris</i>	SN6094	16/07/2019	-	-
Sarcophagidae	<i>Sarcophaga vagans</i>	SN6193	19/05/2019	-	m
Sarcophagidae	<i>Sarcophaga vagans</i>	SN6093	02/08/2019	-	m
Sarcophagidae	<i>Sarcophila latifrons</i>	SN6093	20/06/2019	1	f
Sarcophagidae	<i>Sarcophila latifrons</i>	SN605935	16/07/2019	1	m
Sarcophagidae	<i>Sarcophila latifrons</i>	SN608944	02/08/2019	1	m
Sarcophagidae	<i>Sarcophila latifrons</i>	SN6094	02/08/2019	1	f

Taxon	Species	Grid Ref	Date	Abundance	Sex
Sarcophagidae	<i>Sarcophila latifrons</i>	SN6093	02/08/2019	12	m
Sarcophagidae	<i>Senotainia conica</i>	SN6094	19/05/2019	-	-
Sarcophagidae	<i>Senotainia conica</i>	SN6093	19/05/2019	numbers	m & f
Sarcophagidae	<i>Senotainia conica</i>	SN60829443	20/06/2019	10	m & f
Sarcophagidae	<i>Senotainia conica</i>	SN6093	20/06/2019	1	m
Sarcophagidae	<i>Senotainia conica</i>	SN6193	20/06/2019	4	m & f
Sarcophagidae	<i>Senotainia conica</i>	SN605936	20/06/2019	-	-
Sarcophagidae	<i>Senotainia conica</i>	SN605938	16/07/2019	numerous	m & f
Sarcophagidae	<i>Senotainia conica</i>	SN6094	16/07/2019	numbers	m & f
Sarcophagidae	<i>Senotainia conica</i>	SN608944	02/08/2019	-	-
Sarcophagidae	<i>Senotainia conica</i>	SN605937	02/08/2019	numerous	-
Sciomyzidae	<i>Coremacera marginata</i>	SN6094	02/08/2019	-	-
Sciomyzidae	<i>Elgiva sollicita</i>	SN6193	19/05/2019	-	-
Sciomyzidae	<i>Pherbellia cinerella</i>	SN6093	19/05/2019	-	-
Sciomyzidae	<i>Pherbellia cinerella</i>	SN6093	20/06/2019	2	f
Sciomyzidae	<i>Pherbellia cinerella</i>	SN6093	20/06/2019	-	-
Sciomyzidae	<i>Pherbellia cinerella</i>	SN6193	20/06/2019	2	m & f
Sciomyzidae	<i>Pherbellia cinerella</i>	SN6094	16/07/2019	1	m
Sciomyzidae	<i>Pherbellia cinerella</i>	SN6094	02/08/2019	-	-
Sciomyzidae	<i>Pherbellia griseola</i>	SN6094	16/07/2019	1	f
Sepsidae	<i>Sepsis cynipsea</i>	SN6094	02/08/2019	-	-
Syrphidae	<i>Chrysotoxum festivum</i>	SN6093	02/08/2019	-	-
Syrphidae	<i>Chrysotoxum festivum</i>	SN6094	02/08/2019	-	-
Syrphidae	<i>Episyrphus balteatus</i>	SN6094	02/08/2019	-	-
Syrphidae	<i>Eristalis horticola</i>	SN6093	02/08/2019	-	-
Syrphidae	<i>Eristalis nemorum</i>	SN6093	02/08/2019	-	-
Syrphidae	<i>Eristalis pertinax</i>	SN6094	04/05/2019	several	m
Syrphidae	<i>Eristalis tenax</i>	SN6094	02/08/2019	-	-
Syrphidae	<i>Eupeodes corollae</i>	SN6094	04/05/2019	2	m & f
Syrphidae	<i>Eupeodes corollae</i>	SN6193	20/06/2019	1	f
Syrphidae	<i>Eupeodes corollae</i>	SN6193	20/06/2019	1	m
Syrphidae	<i>Eupeodes corollae</i>	SN6093	02/08/2019	1	m
Syrphidae	<i>Eupeodes corollae</i>	SN6094	02/08/2019	1	f
Syrphidae	<i>Helophilus pendulus</i>	SN6094	02/08/2019	-	-
Syrphidae	<i>Helophilus trivittatus</i>	SN6093	02/08/2019	-	-
Syrphidae	<i>Melanostoma mellinum</i>	SN6094	02/08/2019	-	-
Syrphidae	<i>Paragus haemorrhous</i>	SN6094	16/07/2019	f	-
Syrphidae	<i>Paragus haemorrhous</i>	SN6094	02/08/2019	1	m
Syrphidae	<i>Platycheirus clypeatus</i>	SN6093	19/05/2019	1	f
Syrphidae	<i>Platycheirus clypeatus</i>	SN6094	16/07/2019	-	f
Syrphidae	<i>Scaeva pyrastris</i>	SN6093	02/08/2019	-	-
Syrphidae	<i>Sphaerophoria scripta</i>	SN6093	20/06/2019	1	m
Syrphidae	<i>Sphaerophoria scripta</i>	SN6094	16/07/2019	-	m
Syrphidae	<i>Syrirta pipiens</i>	SN6193	04/05/2019	1	-
Syrphidae	<i>Syrirta pipiens</i>	SN6094	02/08/2019	-	-

Taxon	Species	Grid Ref	Date	Abundance	Sex
Syrphidae	<i>Volucella bombylans</i>	SN6093	20/06/2019	-	-
Syrphidae	<i>Xylota segnis</i>	SN6094	02/08/2019	-	-
Tachinidae	<i>Medina collaris</i>	SN6193	19/05/2019	-	-
Tachinidae	<i>Meigenia mutabilis</i>	SN6193	20/06/2019	1	m
Tachinidae	<i>Meigenia sp.</i>	SN6093	19/05/2019	-	-
Tachinidae	<i>Phryxe heraclei</i>	SN6193	04/05/2019	1	m
Tachinidae	<i>Phryxe heraclei</i>	SN6093	19/05/2019	1	m
Tachinidae	<i>Phryxe vulgaris</i>	SN6094	16/07/2019	1	m
Tachinidae	<i>Prosenia siberita</i>	SN6093	02/08/2019	-	-
Tachinidae	<i>Siphona geniculata</i>	SN6193	20/06/2019	1	m
Tachinidae	<i>Siphona geniculata</i>	SN6193	20/06/2019	-	-
Tephritidae	<i>Acanthiophilus helianthi</i>	SN6094	02/08/2019	5	-
Tephritidae	<i>Dioxya bidentis</i>	SN6093	02/08/2019	1	m
Tephritidae	<i>Trupanea stellata</i>	SN6094	02/08/2019	2	-
Therevidae	<i>Acrosathe annulata</i>	SN6094	19/05/2019	-	m
Therevidae	<i>Acrosathe annulata</i>	SN6093	19/05/2019	1	m
Therevidae	<i>Acrosathe annulata</i>	SN6094	02/08/2019	1	f
Therevidae	<i>Acrosathe annulata</i>	SN605937	02/08/2019	1	f
Therevidae	<i>Dialineura anilis</i>	SN6094	20/06/2019	-	-
Therevidae	<i>Thereva nobilitata</i>	SN6193	20/06/2019	1	m
Therevidae	<i>Thereva nobilitata</i>	SN6193	20/06/2019	3	m & f
Therevidae	<i>Thereva nobilitata</i>	SN6193	02/08/2019	-	-
Trioxoscelidae	<i>Trioxoscelis obscurella</i>	SN6093	20/06/2019	1	-
Trioxoscelidae	<i>Trioxoscelis obscurella</i>	SN6094	20/06/2019	1	-
Trioxoscelidae	<i>Trioxoscelis obscurella</i>	SN6094	16/07/2019	-	-
Trioxoscelidae	<i>Trioxoscelis obscurella</i>	SN605937	02/08/2019	2	-
Ulidiidae	<i>Tetanops myopina</i>	SN6193	20/06/2019	1	m
Ulidiidae	<i>Tetanops myopina</i>	SN6094	20/06/2019	1	-

10. Data Archive Appendix

The data archive contains:

[A] The final report in Microsoft Word and Adobe PDF formats.

[B] Species records, which are held on the NRW Recorder 6 database.

Metadata for this project is publicly accessible through Natural Resources Wales' Library Catalogue <http://libcat.naturalresources.wales> or <http://catllyfr.cyfoethnaturiol.cymru> by searching 'Dataset Titles'. The metadata is held as record no 124629.