

# The status and distribution of solitary bee *Stelis ornatula* and solitary wasp *Podalonia affinis* on the Sefton Coast in 2019

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## SUMMARY

The Wildlife Trust for Lancashire, Manchester & North Merseyside (Lancashire Wildlife Trust) were commissioned by Liverpool Museum's Tanyptera project to undertake targeted survey of Nationally Rare (and regionally rare) aculeate bees and wasps on various sites on the Sefton Coast.

- *Podalonia affinis* is confirmed as extant on the Sefton Coast; it is definitely present at Ainsdale NNR and is possibly present at Freshfield Dune Heath.
- *Stelis ornatula*, *Mimesa bruxellensis* and *Bombus humilis* are not confirmed as currently present at the sites surveyed for this report.
- A total of 141 records were made (see attached data list) of 48 aculeate species. The majority of samples were of aculeate wasps (Sphecidae, Crabronidae and Pompilidae).

## INTRODUCTION

### PRIMARY SPECIES (Status)

#### *Stelis ornatula*

There are 9 records of this species for VC59 between 1975 and 2000. All the records are from the Sefton Coast. The host of this parasitic species is *Hoplitis claviventris* which is also recorded predominantly from the coast (in VC59). All records are from Ainsdale National Nature Reserve (NNR) and Formby (Formby Point and Ravenmeols Dunes).

#### *Podalonia affinis*

There are 15 VC59 records for this species which includes both older, unconfirmed records and more recent confirmed records based on specimens. The recent (post 1970) records for VC59 are restricted to areas of Ainsdale NNR and Freshfield Dune Heath (with the most recent from the Lancs WT managed Freshfield Dune Heath in 1997). All UK records are from coastal dune or heathland sites.

### SECONDARY SPECIES (status)

#### *Mimesa bruxellensis*

There are eight north west records (Lancashire – none for N. Wales, Cheshire or Cumbria) of this species (though non-digitised information from specimen labels in Manchester and Liverpool Museums would add to the total), all from a restricted area of the Sefton Coast (Ainsdale NNR and Ainsdale / Birkdale), spanning 1975 – 1999.

#### *Bombus humilis*

Due to taxonomic confusion / changes, and possibly misidentification with closely related species, it is unknown as to the exact historic status of this species in Lancashire and Cheshire. It was possibly listed (under *B. venustus*) as “fairly distributed but nowhere abundant (Wirral and Cheshire)” based on records from 1800s in Gardner W (1901). There was historical confusion in the UK between many bumblebees in the *Thoracobombus* sub-genus (S. Roberts pers. comm.) and it is possible Gardner’s description also includes / relates to *B. muscorum*, partly or entirely. There are no known confirmed records between those in the late 1800’s and records from Carl Clee at Ness Gardens and Thurstaston on the Wirral in 2015.

## AIM AND OBJECTIVES

### AIM

1. Determine the status and distribution of the parasitic bee *Stelis ornatula* and sand wasp *Podalonia affinis* at all previously known sites along the Sefton Coast and survey all potential habitat for these species.
2. Report on all other identifiable aculeates encountered, with special attention to the bumblebee *Bombus humilis* (much nationally declined and regionally very rare, BAP listed) and aculeate wasp *Mimesa bruxellensis* (Nationally Scarce).

### OBJECTIVES

- 1) Using historical data, plan site visits and liaise with the Tanyptera Regional Entomologist regarding gaining permissions for site access and a licence for taking samples.
- 2) Survey all historical and potential sites for adult *Stelis ornatula* and *Podalonia affinis* during Summer 2019.
- 3) Identify and report on any adverse management issues that could have a detrimental effect on the status of the above species, including any other notable aculeates found, and any opportunities to improve / secure habitat quality in the future.
- 4) Submit a final report containing all findings and suggestions for further study by 31<sup>st</sup> October 2019.

## METHODS

### AREA OF COVERAGE

Although all areas of the Sefton Coast have potential for one or more of the target species, priority was given to the specific land holdings with records for the species (Natural England (NE) and National Trust (NT) owned land). Permits for survey from NT (Formby Point and surrounding NT land), NE (Ainsdale NNR) and Sefton Metropolitan Borough Council (SBC) (Ainsdale & Birkdale Sand Dunes Local Nature Reserve, Hightown dunes and other SBC SSSI areas) were sought in May 2019. Permits for survey of NT and NE owned land was promptly received, however a SBC permit was not received and therefore no surveys were carried out on SSSI land owned by Sefton (though non-SSSI areas were visited). Late in the survey period (early August) when several visits to the priority sites had been undertaken, Altcar Rifle Range was contacted with a view to visiting, but no permit was issued to survey.

### SURVEY

- 13 days field survey were carried out between 09/06/19 and 22/08/19.
- Surveys were undertaken in temperatures of at least 17°C (as an average, daily minimum), with light winds and a low (<10 %) chance of precipitation.

- Surveys were usually started between 09.00 and 10.00 and finished between 15.30 and 17.00. Often higher temperatures were used as a prompt for surveys in which case surveys started earlier (08.00 – 08.30) when insect activity would start earlier and before numbers of people were higher. A short (15-30 min) break was usually undertaken during the hottest part of the day between 13.00 and 14.00.
- Surveys were conducted at a slow walking speed (approx. 50 meters per minute).
- The bulk of surveying was direct netting of insects from areas of activity such as sandy banks, flowering plants, edges of vegetation and tree lines. Particular priority was given to precise locations (6-8 figure grid references) with previous records for one or more of the target species, although many of the data records are imprecise ( $\leq$  2-4 figure grid references).
- More ‘generalised sweeping’ was undertaken in areas that were more densely vegetated such as areas of scrub or between open sand & flower-rich areas (including sweeping through vegetation and amongst branches). Some small trees in sheltered areas attracted ‘lekking’ male wasps and bees of many species, so these trees were ‘swept generally’ with a stronger net.
- Limited pan trapping was undertaken using small, yellow pan traps set up with water and detergent for passive sampling. This was most appropriate in areas with lower footfall and on routes where a circuitous transect route would allow for setting up and recovering the pans over the course of a visit (restricted to Ainsdale NNR). This was carried out on four visits.
- Limited observation of bramble (*Rubus Sp.*) was undertaken in order to ascertain presence of tenanted stem-nesting aculeates. As most nests would be active, rather than dormant, during the survey period, this technique was delayed until after the Summer survey period.
- All species unidentifiable with certainty using field characters were sampled as specimens in 70% ethanol and subsequently pinned, identified under a microscope (excluding *Ichneumonidae*) and labelled (to be deposited at World Museum, Liverpool).
- Despite subtle differences described in various texts and accounts (size and hairiness) between target species *P. affinis* and the related, more abundant *P. hirsuta*, it was not thought reliable to rely on field identification, therefore all *Podalonia* encountered and successfully caught were collected.

## RESULTS

### TARGET SPECIES

Of the primary target species, two adult *Podalonia affinis* were recorded. Both records are from reasonably central areas of Ainsdale NNR and both locations are for areas of open habitat closely adjacent to planted conifers (predominantly *Pinus nigra*). On one of the later surveys (24/08/19) a *Podalonia* sp. was spotted at Freshfield Dune Heath at (SD2932709297). The insect was extremely active and difficult to get near to net so it wasn’t possible to confirm the identity to species level. However, there is a strong possibility this individual was *P. affinis* as this site has the most recent records of this species; male specimens were recorded by Carl Clee in 1997 at SD295094 (Sefton Coast Invertebrate Survey by Liverpool Museum). The description of the area provided by Clee

(pers.comm. 2019) matches the grid reference of the record and if not as close as 100 metres to the above 10 figure grid, is undoubtedly from the same compartment. To the surveyor's knowledge of all available records, *Podalonia hirsuta* has never been recorded from Freshfield Dune Heath. Given that the site has been well recorded (recently) by the surveyor and Carl Clee, it is conceivable that *P. hirsuta* is indeed absent.

No records of the other target species; *Stelis ornatula*, *Mimesa bruxellensis* and *Bombus humilis* were made.

A total of 141 records were made (see attached data list) of 48 aculeate species. Aculeate species included bees, wasps and ants but the majority of samples were of aculeate wasps (*Sphecidae*, *Crabronidae* and *Pompilidae*). Non aculeate species included one sawfly (*Symphyta*) and three hoverflies (*Syrphidae*). Of this total, four specimens (aculeates) were recorded in pan traps, with the remaining being caught (by net). The majority of records are based on sampled material although five distinctive and field identifiable species of social wasp (Vespinae); *Ammophila sabulosa*, *Crossocerus quadrimaculatus*, *Mellinus arvensis*, *Episyron rufipes* and *Pompilius cinereus* and some bees of the *Bombus* and *Megachile* genus could be reliably identified in the field and were released following close observation and/or examination.

A joint Natural History Museum (NHM) / NE "genoblitz" was held at Ainsdale NNR between the 1<sup>st</sup> and 5<sup>th</sup> July, 2019. The aim of the event was to sample a wide range of taxa which could be identified and linked to extracted DNA for the NHM "Tree of Life" project. The surveyor attended and provided specimens for the project, none of which were the target species for this study. It was reported that one specimen of *P. affinis* was thought to have been collected by one of the NHM / NE surveyors during that period (Gavin Broad, pers. comm. 2019), but at the time of writing there had not been any confirmation or location details. It is not thought that any other specimens of the target species were collected during the genoblitz (Gavin Broad, pers. comm. 2019).

## **OTHER NOTABLE RECORDS**

*Gorytes laticinctus* - 1st VC59 record (recorded from Cheshire in 2018).

*Gorytes quadrifasciatus* - 2nd VC59 record (one in 2015 for Otterspool, Liverpool).

*Nysson trimaculatus* - 1st VC59 record (there is a recent record for Cheshire).

*Diodontus luperus* - There are five previous records for VC59 on the VC recorder's database, but only one specimen in Liverpool. Very much the least common of the three Sefton Coast species in this genus (the other two species; *D. tristis* and *D. minutus*, were locally common in parts of the survey area).

*Bombus monticola* - Undoubtedly a vagrant, this bumblebee is known to wander out of established, upland moorland range (Rich Burkmar has recorded it at Southport, pers. comm. 2019) and there may still be an extant, long lasting population at Hilbre Island. There was a strong southerly wind when the specimen was found.

## DISCUSSION

### *Podalonia affinis*

*P. affinis* has always been rare on the Sefton Coast, illustrated by previous records and the current study. It is difficult to interpret anything substantive from the current project results, but the location of the records is useful in terms of future surveillance. Given the lack of records from more open dune areas, it is tempting to suggest that *P. affinis* might have some affinity for the tree and scrub / open sand interface which is present throughout the area from Ainsdale NNR to areas of Formby Point. It could be that this interface shares characteristics with heathland areas when the species can be found in other parts of the UK, although discussion with specialists in other areas of the UK - including specific information on where *P. affinis* is found, especially in the stronghold of eastern England, would be required before this could be shown to be significant.

Alternatively, it may just be that the areas of tree and scrub / open sand interface have the highest density and diversity of aculeates compared to open sand areas, with some shelter from wind that could serve to increase and optimise temperature. The records from the current study certainly indicate these interface areas as being particularly productive in numbers / diverse in range with regard to aculeates.

In my opinion the species must still be regarded as rare and restricted in VC59 (even more so in VC 60 where there is a single 1992 record). It is a species that really needs to be looked for intensely. Further research into other areas of the Sefton Coast to ascertain presence would be useful.

### *Stelis ornatula*

*S. ornatula* may well be a difficult species to find, as is the case with many cleptoparasitic bees associated with hosts that are themselves uncommon. Additionally, these obligate parasitic species of aculeates can have dynamic population fluxes, seeming to disappear for periods of time before 'reappearing' in the same or similar locations. The fact that some of the UK *S. ornatula* records are a result of rearing is interesting. Else and Edwards (2018) state this is an elusive species, generally encountered in low numbers or as lone individuals. It may also exist at low population levels (as may its host). Although it is not known as to the locations / abundance data of the most recent UK records, only two (from southern England) were traced on the BWARS Facebook site which has been generating plentiful records since 2015 - present.

The lack of host (*H. claviventris*) records during the current study was not encouraging and future study of all areas with more recent records of *H. claviventris* would be worthwhile. A distinct lack of plentiful Bird's-foot Trefoil (*Lotus corniculatus*) - a favoured pollen source for the host species - was noted during the current study. Although the plant is widespread throughout the Sefton Coast dune system, it rarely achieves a dominant status in the plant communities. Any other areas of the coast where *L. corniculatus* is known to be particularly abundant (with records for *H. claviventris* or not) would be worthy of future study.

### *Mimesa bruxellensis*

*M. bruxellensis* was not found. Of all the species being targeted it is a species that is known for sporadic occurrence. There was a huge national decline in records from recorded UK locations between 1980 and 1990 followed by sudden increase in records from recorded locations between 1990 and 2000 (M. Edwards, pers. comm 2019). This is mirrored exactly in Lancashire, with a complete lack of records between 1981 and 1999 (the peak for UK records / populations was in 1997).

When present this seems a species that can be noticed due to sheer abundance of males (100 males have been seen in a swarm over some Norfolk gardens (Tim Strudwick, BWARS Facebook site and pers. comm. 2019) and there is a strongly suspected association with leafhoppers on Aspen (*Populus*) and also other poplars (*Populus sp.*). Aspen, and also black, white and hybrid poplars are widespread throughout the Sefton Coast. At Ainsdale and Formby these trees were searched deliberately for this species throughout the survey period, but especially in late July / August (all Lancashire records are for this period).

This could also be a species that has either (A) not established a strong presence in the area and has become locally extinct (perhaps periodically, followed by re-colonisation) or (B) may continue to exist at very low levels. Only further research will improve our understanding. The Sefton Coast is by far the most northerly recorded location for this species and there are only four other west coast records, the nearest being South Wales, although there is another recent record from Shropshire which is quite remote from all other records.

### *Bombus humilis*

*B. humilis* was not found. Few *Bombus* were recorded during the survey and no species was seen in great numbers (including the related and often abundant *Bombus pascuorum*). It is therefore no surprise that despite much looking over areas with favoured plants *L. corniculatus* and *Anthyllis vulneraria*, one of the most regionally rare species was not seen.

*B. humilis* was added to the target list as a secondary species, on the strength of recent Wirral records (Section I: Context) and almost certain photographs and images of the species at North Walney Island. It is conceivable that this species may be present at low levels in the north west or that Wirral and Cumbria records represent vagrant and/or poorly established populations. It would be worth keeping an eye out for the species in future, as coastal areas are possibly the only likely areas in the north west (other than Morecambe Bay) with sufficient species-rich habitat and to be able to support populations.

## LIMITATIONS

- Malaise traps were not used. There were few sites within the current study area that would have been suitable to site a malaise trap, although the surveyor has run them before in 2016, 2017 and 2018 at Freshfield Dune Heath (these collected significant aculeate material, but not any of the target species associated with this study).

- It was regrettable that SSSI areas owned by Sefton B.C. (Ainsdale, Hightown) and the Ministry of Defence (Altcar Rifle Range) could not be studied. This restricted the survey to areas of Formby, Freshfield and Ainsdale.

## FOLLOW-UP WORK

When time allows over the winter period 2019/20, the surveyor will search for potential stem nests of aculeates along the Sefton Coast and update this report accordingly. Of all the target species only *S. ornatula* is likely to be reared from a stem nest, as the host (*H. claviventris*) frequently nests within pithy stemmed plant species such as *Rubus*, *Rosa* and *Senecio*. Such stems nests can be reared out. At the time of the current report (31/10/19) a number of potential stem (*Rubus* and *Rosa*) nests have been sampled from Formby, Ainsdale and Birkdale, although (so far) none appear to be of *H. claviventris*, which cap the cell with masticated substances including leaf matter. It is likely that most of the nests are of aculeate (crabronid and pemphredonine) wasps, although these will still be reared out in interests of further data collection (and deposited at World Museum, Liverpool).

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