

**Tormentil mining bee *Andrena tarsata*
and nomad *Nomada roberjeotiana*
Surveys and update report 2019**



Report summary

A resurvey of the Tormentil mining bee *Andrena tarsata* sites in Yorkshire re-found the species at three key sites, there were no records of *Nomada roberjeotiana* although some sites had historic records. The surveys also recorded habitat type and key features of each site and makes recommendations for management at the site to benefit these species. The recommendation will also benefit a number of other heath/moorland mining bee species, as well as other invertebrates; as bare ground is a key nesting/foraging habitat and Tormentil an important pollen and nectar source. This report is the start of ongoing surveys and studies of these two species in Yorkshire.

Acknowledgements

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Background

This project aimed to examine the state of *Andrena tarsata*, a recognised UK threatened species and conservation priority, and its associated nomad bee *Nomada roberjeotiana* a nest parasite ('cuckoo bee') in the stronghold of Yorkshire, to make management recommendations to ensure their long-term survival in the county. This project builds on the survey work done by Louise Hislop in 2010/11. The objectives of the project were:

- Work with key volunteers and site users to explore the York heathlands and the North Yorkshire moors to better understand the distribution of the two bees
- Mapping of nest sites and its foodplant Tormentil to better understand the bees' requirements in Yorkshire, as well as assess wider habitat opportunities
- Define next steps for habitat improvements by identifying potential areas to create new habitat and restore existing sites
- Engage landowners, managers and wider volunteers in discussions around the species and opportunities to embed habitat improvements within existing management practices

Species' description

Andrena tarsata is a small dark solitary bee. The female (7-10mm) has translucent yellow-orange hind tibia and tarsi in contrast to the dark femur. Its mesonotum is partially black-haired, and only British *Andrena* female with a three-toothed mandible, rather than uni- or bidentate (though worn specimens appear two-toothed). The tergites appear 'lumpy'. The male (6-9mm) is one of a small number of British species to have a yellow/creamy-white clypeus with two black spots, a mix of black and silver/white hairs on the thorax (other similar species have only pale hair) and the

outer surface of hind tarsi are translucent yellowish-brown, contrasting with the red/brown of the hind tibia. Inner orbital margin is fringed with upstanding black hairs (Hislop 2011 & GR Else, BWARS website).



Andrena tarsata female foraging at Allertorpe Common (c) Vicky Wilkins

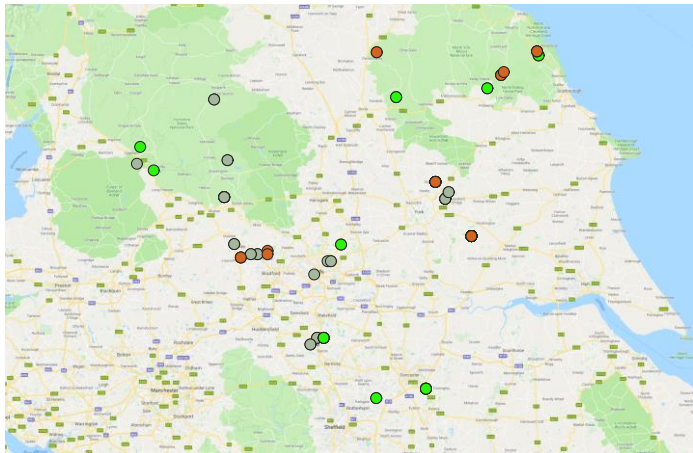
Its nomad *Nomada roberjeotiana* is a small (5.5-6mm) nomad bee with the gaster mainly red and with a pair of lateral yellow spots on gastral tergites 2 and 3; plus a red scutellum (GR Else, BWARS website).

Distribution

Andrena tarsata is a northern European bee, that becomes scarcer further south. Stöckhert (1933) describes it as being a boreal-alpine species. Its range extends from central Fennoscandia south to Spain, and eastwards to the former Czechoslovakia and USSR (GR Else, BWARS website).

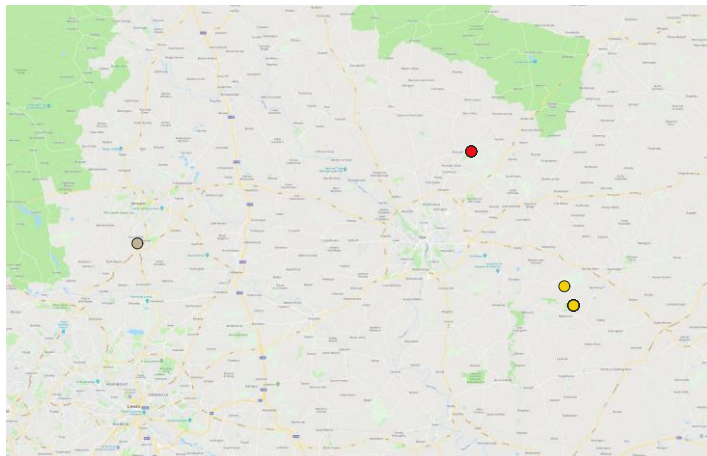
It is found across the UK in England, Wales and Scotland, with strongholds in Yorkshire and the South West (Cornwall, Devon and Dorset). The Tormentil mining bee is widespread, however the species has been lost from 50% of its former sites since 1970 so its distribution is fragmented and localised (BWARS data). The South West and Yorkshire have been identified as strongholds for the species (Buglife 2014). It is nearly always scarce, but it is possibly under-recorded because of its small size.

Recent surveys by the Paddy Saunders has identified 7 Cornish sites for the Tormentil Nomad Bee. The West Penwith area is likely to be of national importance, as it currently has more recorded sites for the Tormentil Nomad bee than anywhere else in the UK (Saunders 2015).



Map data © 2019 Google and data points BWARS

Here is a map of the BWARS data of the historic distribution of *Andrena tarsata* in Yorkshire. Red dots are 2000-2019 records, green dots are 1980-1999 records and grey dots are 1900-1979. With York at the centre of the map. Potentially demonstrating the increasing restrictedness of this species in the county – as many of the sites have remained the same just becoming more restricted.



Map data © 2019 Google and data points BWARS

Here is a map of the BWARS data of the historic distribution of *Nomada roberjeotiana* in Yorkshire. Red dots are 2000-2019 records, yellow dots are 1980-1999 records and grey dots are 1900-1979. With York at the centre of the map.

Nomada roberjeotiana is also a northern European bee, becoming sporadic further south in central Europe; it is also known from Japan (G R Else, BWARS website).

It is much scarcer than *A. tarsata*, since it only occurs where populations of its host are particularly strong (Dimond et al. 2016). The Tormentil nomad bee was formerly widespread in England, West Wales and into Southern Scotland. The only recent records are from two sites in Cornwall and one in Yorkshire, though it may be undetected elsewhere (Buglife 2014).

Status

Due to the changes in the populations of *Andrena tarsata* in Northern Europe and the evidence of its decline in UK, particularly the number of occupied sites post 1970 (JNCC 2010), it has been listed as a S41 Priority species in England due to dramatic declines. On the 'European Bee Red List' it is listed as being Data Deficient (Nieto et al 2014). *Nomada roberjeotiana* does not have or had a conservation listing in the UK and is on the European with a red list status of Near Threatened (Nieto et al 2014).

Habitat ecology

Andrena tarsata can be found on the wing for 4-6 weeks between mid-June to late August, although in the North Yorkshire Moors it appears to stop flying in early August (L. Hislop *pers comms*). In Cornish surveys males 'peak' earlier than the females in June (Saunders 2019). The species produces one brood annually (Hislop 2011).

It is found on acid habitats such as moorland, heath, acid grasslands and open wood (but more rarely). They also colonise disturbed areas such as cleared woodland plots and abandoned quarries. Woodland rides, scrub and roadside verges may provide habitat corridors between sites (Buglife 2014). They prefer sunlit, sheltered areas where they can keep warm and active.

It is considered to be an oligolectic species, is heavily reliant on *Potentilla erecta*, (Tormentil) as a source of pollen and nectar – although on occasion it will use similar flowering plants for nectar. For example, using shrubby cinquefoil *P. fruticosa*, for pollen in Scotland – Highland Murdo MacDonald, Edinburgh (L. Hislop *pers comms*) Tormentil is a perennial herb in the Rosaceae, Rose Family. *A. tarsata* require high densities of flowers, particularly dense bushy stands of Tormentil flowers, that are not heavily grazed. Ideally 30% of the site with a high density of Tormentil in July (Saunders 2019). Previous studies have shown a clear link between Tormentil flower abundance and Tormentil mining bee abundance (Saunders 2016). In Europe it has been noted that the species does use other species of *Potentilla*, as well as other Rosaceae (*Fillipendula* and *Rubus*) and has been observed visiting *Calluna* for nectar (S. Robert *pers comms*; Hislop 2011).

Female Tormentil mining bees collect Tormentil pollen to stock the nest for their larvae. Though Tormentil mining bees may form nesting aggregations, each nest is independent. Preferred nest sites are sheltered, sunlit, south (east)-facing bare earth banks that are vertical or sloping (Saunders 2019, Potts & Wilmer 1998) but flat and low areas have also been observed (Saunders 2016, 2019). Other bare or sparsely vegetated areas such as paths and tracks may also be used up to 250m from nest sites (Buglife sheet 2014). It is critically important that potential nest sites are close to high densities of good quality tormentil plants (P. Saunders *pers comms*).

Tormentil nomad bees is a cleptoparasite of *A. tarsata* lay their eggs in Tormentil mining bee nests where the larvae hatch and eat the host's food stores (Buglife sheet 2014).

Threats

The threats to these species are loss, fragmentation and deterioration of Tormentil-rich habitats through agricultural improvement, loss of heathland, overgrazing and undergrazing. Taller bushy stands of Tormentil have been lost in moorland areas to heavy summer grazing. Although Tormentil is still present it is often very low growing without the taller bushy stands, and so it does not provide the right habitat for this species. Forestry operations can also cause local extinctions by churning up rides (Buglife sheet 2014). The loss of Tormentil and nesting sites are also threatened due to scrubbing over by dominating species, such as bracken and gorse related to changes in management. In Cornish surveys that have been conducted annually it has been noted that the hot and dry summers have affected the numbers of Tormentil mining bees recorded, and so climate change may be another threat to this species.

Management (partly adapted from Buglife management sheet 2014)

Maintain food sources through achieving tall and bushy Tormentil plants covering 30% of key areas in July by:

- Maximise the abundance of flowering Tormentil between 15th May and end of August by avoiding cutting or heavy grazing
- Type of stock needs to be considered as sheep, ponies and cattle graze differently. Ponies and cattle should generally be preferred, but winter sheep are also quite good for this bee (Saunders *pers comms* 2019).
- On heathland and other habitats, keep a varied vegetation structure (for example heather on heathland) so that Tormentil can grow in grassy clearings and maintain Tormentil-rich verges and along tracks and manage scrub when appropriate; and rotational management to avoid tussocky grass and other competitors
- Controlled burning (swaling) of heathlands with heavy scrub or Purple moor grass may benefit Tormentil growth. If this is applied, burn plots in a rotation of 3 years or more.
- In Tormentil-rich acid grassland, avoid applying fertilisers or pesticides and remove arisings that result from any cutting

Retain open bare-ground nest sites by:

- Known or potential nesting areas should be kept free of encroaching vegetation such as coarse grasses or scrub
- In Cornwall an artificial bee banks were created, both areas were roughly south facing. With areas of both sloping and vertical bare ground. One area had a layer of china clay. Small parabolic 'dips' were created to boost diversity of micro-climate and niches. In addition, a trench about 4-5m long with spoil banked above. height about 2.5m. This was created using a natural slope feature, and a range of loamy and peat soils were exposed (Saunders 2016). It took two years for the feature to be colonised (Saunders 2019).

Yorkshire fieldwork 2019

For this first year of survey work no set survey methods were utilised, as the main aim of the work was to understand if the species are still present on the sites.

Jugger Howe, Flyingdales, North Yorkshire

Historic Records	Records 2019	Habitat comments 2019
First recorded from this site in 2010, it is possible that this site was previously overlooked	1 female <i>Andrena tarsata</i> found on tall tormentil on outside of main site next to carpark on a heathy bank	On the main site Tormentil has become very low growing and the fact that the bee appears to have moved outside the site suggests that the tormentil on the main site looks no longer suitable
		There are a large number of managed honeybee hives present on site and honeybees were seen foraging on tormentil where the record was taken – to reduce competition, should not be present in May-August or located at least 1km away
		There are plans to vegetate areas of the site to stop

		erosion and silting on local waterways. It would be best for this work to consider the impact this may have on the species. Ensuring that areas that the species is most likely to use for nesting. As well as creating specially designed nest sites.
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- Remove managed honeybees to at least 1km from the area discussed as being used by the bee at the main Jugger Howe site
- Whenever possible reduce sheep grazing between May-August or overall, to allow taller growing Tormentil to thrive; as winter sheep grazing is best for this bee.
- Keep a varied vegetation structure (for example heather on heathland) so that Tormentil can grow in grassy clearings and maintain Tormentil-rich verges and along tracks and manage scrub e.g. gorse, when appropriate
- Maintain a variety of bare ground areas to allow nesting for species and that the species are not compromised by management and erosion control works, consider creating new nesting areas when funds and opportunities allow
- When cutting heather back/burning rotation and keep an 8m buffer free from cutting and burning from track edges, so to ensure Tormentil is maintained at site edges; ensure high levels of Tormentil are present in the retention areas before cutting/burning
- Ensure that potential nesting areas (bare and sloped areas of substrate) are close to high densities of good quality Tormentil plants

Cod Reservoir

Historic Records	Records 2019	Habitat comments 2019
First recorded in 2011, possible that the site was overlooked previously	5 females recorded on taller tormentil found further into the site	The habitat seems to be in reasonably good condition, although grazing is present taller bushier areas of tormentil is able to grow

Recommendations

- Ensure grazing between May-August is maintained at current level to allow taller growing Tormentil to thrive
- Keep a varied vegetation structure (for example heather on heathland) so that Tormentil can grow in grassy clearings and maintain Tormentil-rich verges and along tracks and manage scrub when appropriate
- Maintain a variety of bare ground areas to allow nesting for species and that the species are not compromised by management and erosion control works, consider creating new nesting areas when funds and opportunities allow

- Maintain open bare ground areas for nests and look for opportunities to create new nesting sites
- Ensure that potential nesting areas are close to high densities of good quality Tormentil plants

Hole of Horecum

Historic Records	Records 2019	Habitat comments 2019
Two records in 1937 and then 2005, again in 2011	None found	Some areas of taller Tormentil present but extensive searching did not find the species
		Grazing may be at a level and of a nature that is preventing tormentil growing high and bushy

Recommendations

- Whenever possible reduce sheep grazing between May-August or overall, to allow taller growing Tormentil to thrive; as winter sheep grazing is best for this bee.
- Keep a varied vegetation structure (for example heather on heathland) so that Tormentil can grow in grassy clearings and maintain Tormentil-rich verges and along tracks and manage scrub e.g. gorse, when appropriate
- Maintain a variety of bare ground areas to allow nesting for species and that the species are not compromised by management and erosion control works, consider creating new nesting areas when funds and opportunities allow
- When cutting heather back/burning rotation and keep an 8m buffer free from cutting and burning from track edges, so to ensure Tormentil is maintained at site edges; ensure high levels of Tormentil are present in the retention areas before cutting/burning
- Ensure that potential nesting areas (bare and sloped areas of substrate) are close to high densities of good quality Tormentil plants

Strensall Common

Historic Records	Records 2019	Habitat comments 2019
Extensive historic records for <i>Andrena tarsata</i> in 1971,1981, 2005, 2006, 2008	None found searched once in good weather	Some taller growing Tormentil in specific areas, such as next to small watercourses
Extensive historic records for <i>Nomada roberjeotiana</i> in 1971, 2004, 2006, 2009	None found	

Recommendations

- Whenever possible reduce sheep grazing between May-August or overall, to allow taller growing Tormentil to thrive; as winter sheep grazing is best for this bee.

- Keep a varied vegetation structure (for example heather on heathland) so that Tormentil can grow in grassy clearings and maintain Tormentil-rich verges and along tracks and manage scrub e.g. gorse, when appropriate
- Maintain a variety of bare ground areas to allow nesting for species and that the species are not compromised by management and erosion control works, consider creating new nesting areas when funds and opportunities allow
- When cutting heather back/burning rotation and keep an 8m buffer free from cutting and burning from track edges, so to ensure Tormentil is maintained at site edges; ensure high levels of Tormentil are present in the retention areas before cutting/burning
- Ensure that potential nesting areas (bare and sloped areas of substrate) are close to high densities of good quality Tormentil plants

Allerthorpe Common

Historic Records	Records 2019	Habitat comments 2019
Extensive historic records for <i>Andrena tarsata</i> in 1925, 1927, 1928, 1929, 1932, 1973, 1974, 1976, 1979, 1980, 1981, 1983, 1984, 2004, 2005, 2006, 2007, 2008	About 10 individuals recorded mainly females	<i>Andrena tarsata</i> found along edge path where habitat remains reasonably open. These open areas need to be maintained as a lot of the previous open heath areas are scrubbing over and becoming reforested
Extensive historic records for <i>Nomada roberjeotiana</i> in 1927, 1928, 1929, 1935, 1973, 1975, 1976, 1983	None found	

Recommendations

- Reduce scrubbing and tree development on site to allow open areas for Tormentil growth
- Keep a varied vegetation structure (for example heather on heathland) so that Tormentil can grow in grassy clearings and maintain Tormentil-rich verges and along tracks and manage scrub when appropriate
- Maintain open bare ground areas for nests and look for opportunities to create new nesting sites for this species
- Ensure that potential nesting areas are close to high densities of good quality Tormentil plants

Discussion

The project has provided ‘first look’ to understand the persistence of this species in the heath and moorland sites of Yorkshire. A number of known sites had reconfirmed presence in 2019 including Allerthorpe Common, Jugger Howe and Cod Reservoir. Other sites weren’t confirmed particularly in the case of Hole Horecum (visited on multiple occasions and in good weather conditions) and Strensall (the size of the site, only one visit made and the lack of clarity on previous records).

This project has collated species information, surveys and gathered expert opinion, this has facilitated some clarity on the habitat needs and threats to this species. One key survey record revealed the importance of tall bushy Tormentil, and this was confirmed by Louise Hislop's experience. On Jugger Howe where the bee had been seen on site previously Louise failed to find the same taller bushy Tormentil plants but there was plenty of lower growing plants. As a result the species was not found on the main site where the plants were now changed and had become low growing, but rather was found outside the site where there was no grazing and so Tormentil was flourishing and growing tall and bushy.

Conclusion

This species is elusive and difficult to record, making it a difficult species for land managers and wider public to engage with. However, it is an interesting and engaging species with some obvious attributes, such as its preferred food plant and the red legs of its females. Its habitat specificity and need for varied and well-managed heath/moorland, that has management achieving good pollen and nectar sources at a key foraging time. As Tormentil is ubiquitous in this area and so its presence is unlikely to be a limiting factor. This means it is a good indicator species of high-quality areas when it is present.

However, achieving the correct type of forage through taller bushier growing Tormentil, together with a varied habitat regime that allows bare-ground areas to be created; will make sites suitable for the species, as well as a whole host of other mining bees, beetles and other invertebrates. There is also the possibility that if healthy enough populations can be found, that reintroducing this species to appropriate sites could be tested, as fragmentation will likely make natural dispersal difficult.

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