Tormentil Mining bee monitoring at Bartinney Hay Meadows.

Tormentil Nomad Bee

2025

Patrick Saunders

Kernow Ecology

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Index

Summary

- Cornwall Wildlife Trust reserves on West Penwith moors are likely to be of national importance for threatened moorland bee species.

- West Penwith holds a major share of the 12 UK sites for Tormentil Nomad Bee (*Nomada roberjeotiana*) with 5 sites, three of them being CWT reserves.

- In 2024 and 2025 Tormentil Nomad Bee (Nomada robertjeotiana) numbers recovered at Bartinney after declining post 2018.

- The late hay cut and winter grazing management at Bartinney Meadows for Tormentil Mining Bee (Andrena tarsata) has been successful at maintaining high abundance of Tormentil flowers. 150-200 flowers per 1m2 should be used as a management target for site managers.

- The mean ratio of Tormentil Nomads to Tormentil Mining Bee is approximately 5:1 over all years. High abundance of flowers is likely to be critical to maintain an abundant host population for Tormentil Mining Bee.

- Rotational creation of suitable bare ground for nesting is emphasized. As the species is nesting in areas which can be difficult to maintain and prone to scrub succession.

- The recent acquisition by CWT of the abandoned Bartinney Downs (14ha), is significant. The acquisition allows much greater scope to develop management prescriptions over wider area, which may be important to increase climate and landscape resilience.

- The Small Flecked Mining Bee (*Andrena coitana*) was found in 2023 at Carn Glaze CWT but not in 2024-25. This species may be highly threatened and Carn Glaze CWT is the only site in West Cornwall. Bartinney Meadows CWT supports 53 bee and wasp species with a further five species recorded at Carn Glaze and Bartinney Castle CWT. In 2025 Brown Banded Carder Bee was a new species.

- A review of BWARS data and Met office climate data suggests climate change is likely to be a factor in recent national declines in Tormentil Mining Bee.

- High quality flower habitat and nest habitat may be even more important for upland species to mitigate against the negative effects of climate change and other landscape factors like eutrophication and changes in agricultural subsidies.

Introduction

This report to assess of rare bees at a suite of Cornwall Wildlife Reserves was commissioned by CWT. Previous surveys of West Penwith Moors SSSI have emphasized the importance of the area for specialist bee species (Saunders 2015).

The population of the Tormentil Mining Bee at Bartinney Reserve has been monitored since 2015 (Saunders 2023). This survey aimed to see if trends at Bartinney were also found to be more generally true for the population as a whole. The report gives management recommendations based on the findings.

The site is managed with a late-hay on rotation, whereby half the meadow is cut and removed annually, (usually Sept/October). Followed by winter grazing.

Methodology

Three days of monitoring took place in the peak flight season of the bee, using methodology described in (Saunders 2022). Surveys consisted of walk through surveys, with more time and effort spent in areas of obvious importance to key species. Some habitat additional habitat assessment visits took place listed in separate unpublished document for CWT. The report includes additional information from survey visits from 2021-24.

Picture 1 Small Flecked Mining Bee (Andrena coitana) male.

From 2023 to 2025 only one or two full nest count was made whereas over 2016-22 at least 3 count visits were conducted from late May to late July. This means some caution is needed in comparing 2023-25 with 2016-22.

Key bee species and sites review.

This review applied provisional modern red data book categories for the species below.

Table 1.

	Status	Recorded 2023/24 survey.
Tormentil Nomad Bee (Nomada robertjeotiana)	p RDB NT (EU RDB NT)	Bartinney, Truthwall & Bakers Pit
Tormentil Mining Bee (Andrena tarsata)	BAP p RDB NT	Bartinney (and Bartinney Carn Glaze), Truthwall, Bakers Pit & Bostraze
Perkin's Mining Bee (Andrena rosae)	NS	Bartinney (and Bartinney Carn Glaze), Truthwall, Bakers Pit & Bostraze
Small Flecked Mining Bee (Andrena coitana)	NS p RDB NT	Bartinney Carn Glaze (2023)
Catsear Nomad Bee (Nomada integra)	Scarce	Truthwall & Bartinney
A ruby tailed wasp (Hedychrum niemelai)	NS	Bartinney
Black-headed Mining Bee (Andrena nigriceps)	NS	Truthwall & Bartinney
Brown Banded Carder Bumblebee (Bombus humilis)	BAP	Bartinney (But may just be dispersed invididual not population

Figure 1: Flower rich acid grassland at Bartinney Meadows CWT, managed by late hay-cut. The best patches of the site have 200-300 tormentil flowers per metre.

Long term monitoring study Bartinney CWT
Results-Population monitoring

Overall numbers of Tormentil Bees (*A. tarsata*) and Tormentil Nomads (*N. roberjeotiana*) recovered in 2024 and 2025 after a period of decline over 2018-2023. 2024 and 2025 had the best ever daily total numbers of Tormentil Nomads (16). Overall numbers in 2016 (29) were higher but over three survey visits.

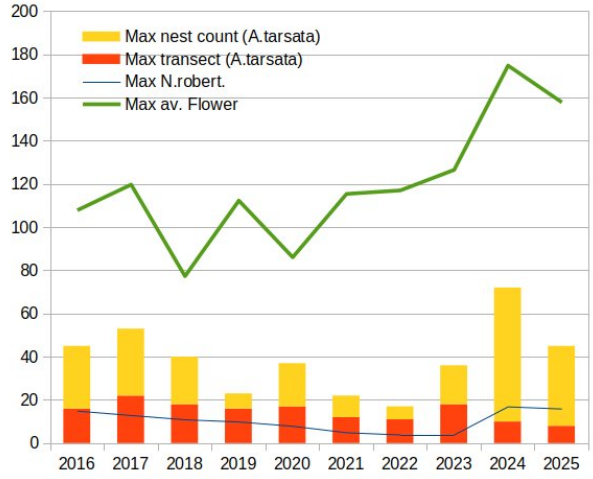

Figure 2: Nest and transect data.

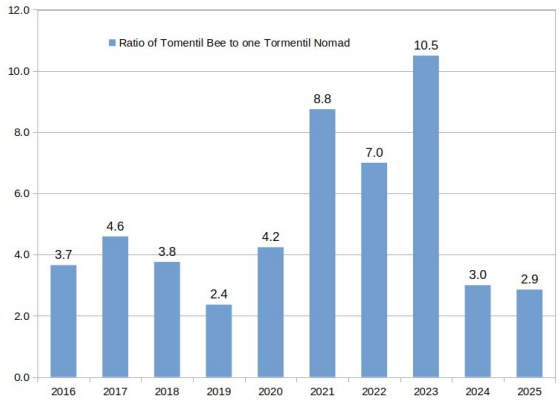

Figure 3: Ratio of Tormentil Bees to Tormentil Nomads

2025 and 2024 had the two highest daily nest count of Tormentil bee (*A. tarsata*) with 37 in 2025. Transect counts were low in 2025 (8).

The mean flowers per transect increased in 2024 and 2025 (158 in 2025). But it is suspected the flower number has some inaccuracies as result of the practical difficulties of doing an absolute flower count by transect.

In 2025 the ratio Tormentil Bees to Tormentil Nomads was almost 3 to 1. The mean ratio Tormentil Bees to Tormentil Nomads to is close to 5 to 1 over all years. There was high degree of variability per year, with 3 years having 10.1 to 7.1

The national review using data from BWARS (Appendix 1.) found a link between modern national declines and locations with high summer maximum temperatures for both Tormentil Mining Bee and Small Flecked Mining Bee (*Andrena coitana*) (Fig. 4.). I have calculated a 64% decline in occupancy of national 10km squares post 2000 for Tormentil Mining Bee and 74% for Tormentil Nomad Bee.

Results-Nest observations.

Approximately thirty six nest site areas have been identified over the survey period (2016-25). The research found nesting to occur in a range of situations, mostly SE facing, but about a third were NE or NW facing.

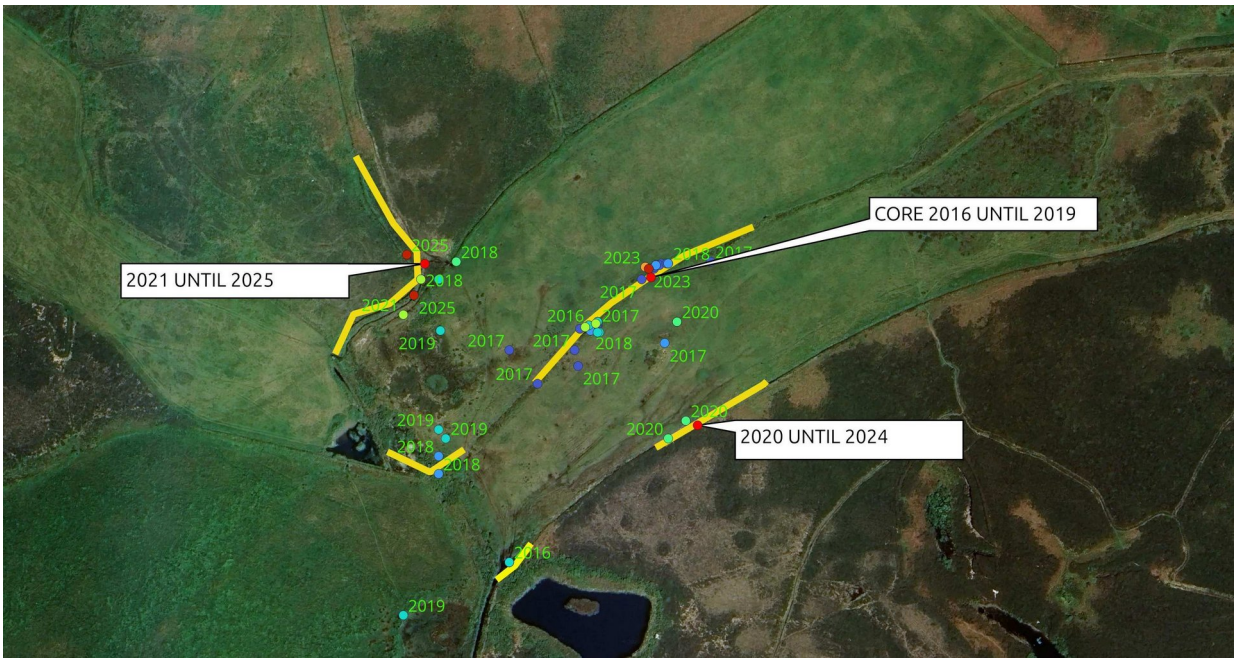

Figure 4: Tormentil Mining Bee (A. tarsata) nest sites

The monitoring emphasises high turnover of nest sites (Fig.4.). By 2025 no Tormentil Bees were found nesting in the core nests (2016-2019) and had abandoned the best area of 2020-24. In 2024 and 2025 the highest nest counts were in a wall burnt in a large heathland fire in 2021. Not all the nests are associated with large areas of bare ground and many did have some scrub shading. It was not established the optimal level of scrub succession but the bees did abandon nest areas when the levels of bare ground were reduced.

Figure 5: Nest Bartinney Down in June 2021 after fire. Which provided important nesting habitat.

Figure 6: By June 2025 the area is important for nesting but was vegetating over.

Nest creation has had mixed success for Tormentil bee. Two “bee banks” were re-profiled with hand tools in 2016 were occupied with 1-2f Tormentil Mining Bee and 1-2f Tormentil Nomads every year 2017-2020. In 2022 sections of the core bank were re-profiled by digger, these areas were occupied by single Tormentil Mining Bee in 2022-2023 and one Tormentil Nomad in 2023 (Picture 4.). These interventions have been more clearly successful for other bees and wasps. Catsear Nomad Bee (Nomada integra) was found in 2023 in the re-profiled nests and since 2022 good numbers of a solitary wasp Cerceris ruficornis and its scarce clepto-parasite a ruby tailed wasp (Hedychrum niemelai). (Cerceris ruficornis being usually more coastal with few inland records in Cornwall). In 2024 the reprofiled areas had good numbers of Large Shaggy Bee (Panurgus banksianus) and the digger wasp (Crabro cribarius). The 2016 bee bank supported about 50 lassioglossum holes in 2022. Nesting was observed of White-zoned Furrow Bee (Lasioglossum leucozonium), Long-faced Furrow Bee (Lasioglossum punctatissimum) Shaggy Furrow Bee (Lasioglossum villosulum), Geoffroy's Blood Bee (Sphecodes geoffrellus), Buff-tailed Mining Bee (Andrena humilis) and Large Shaggy Bee (Panurgus banksianus) in many years.

Figure 7: Core nest area with abundant bare ground in 2015 which gradually re-vegetated. The area was scraped bare by digger in 2022.

The winter grazing is effective at maintaining bare ground (see Appendix 4.), although is a fairly uncontrollable. In 2025 livestock in winter had kept the 2016 feature quite open still but the 2022 areas were largely grown in.

Discussion: What is driving change at Bartinney?

Clearly 2019 – 2022 were poor years. But comparisons between 2016-17 and 2024-25 are more difficult as survey effort was not directly comparable. The total counts and observations suggest the bee possibly was abundant or active for a longer period in 2016-17 than 2024-25.

Post 2016 bare ground around the main nests along the central hedgebank became gradually reduced until the areas were re-scraped in 2022 but the Tormentil Bee have never established themselves in the re-scraped core sites at the levels of 2016-17. The core nests (and nests at Baker Pit CWT) were created by livestock "smashing up" lighter soils on hedge-banks whereas the mechanised scrapes were probably more compacted which could make them more difficult to tunnel. The main new nest area is open bare ground and gaps in stonefacing on a Cornish hedge created by a heathland fire in 2021. The survey suggests both winter grazing, patch burning and mechanized scrapes can all be effective. More complex research is needed on suitable nest substrates and other micro-climatic factors.

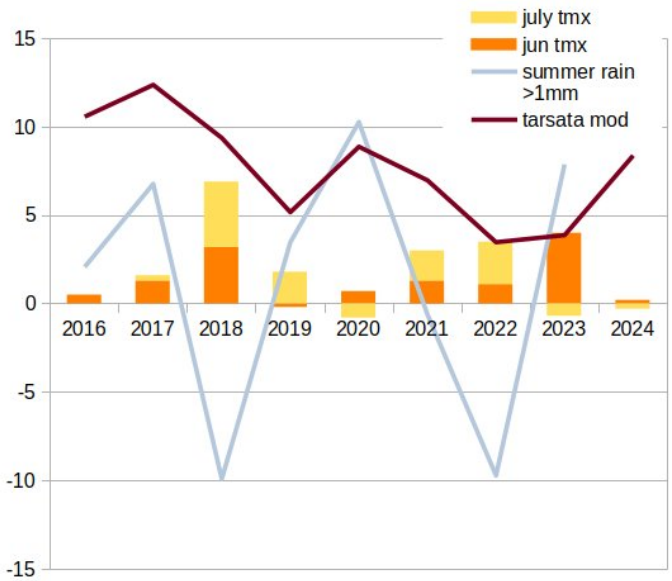

Figure 8 The graph shows the difference between a mean climate variable of Met Office SW England 1970-2015 and a survey year. tmx = mean monthly maximum rain = >1mm. With total tarsata numbers (modified to fit on scale)

The Tormentil bee is a northern boreal species and appears very vulnerable to climatic change (see Appendix 1.). Temperature extremes do show some match with numbers of Tormentil bee (fig 8.), as counts dropped in 2018 and 2022, corresponding with hot and dry summers. But should be interpreted very tentatively, as after the hot summer of 2022 the Tormentil bee numbers rose again. Springs in 2022/23 were extremely dry and cool. Tormentil is likely to be affected by droughts as denser flowering is associated with the wetter parts of the site. It is likely quality and productivity of pollen and nectar is poorer in very dry hot conditions (Descamps et. al. 2021).

In 2020 the nest area with the highest count was north facing area whereas previously nesting was predominately south facing sites. The thermal requirements of nesting could be a significant factor and it is possible hotter summers will promote movement of a boreal species to cooler nest sites.

The management is very effective at delivering Tormentil rich habitat Although flowers numbers have some fluctuations. The site has had consistent management and the (author) feels the fluctuations also partly a down to the difficulties of making precise flower counts. The mean flower count is 119.6 but the rich patches within the transects possibly favoured by the bee have 200-300 flowers per metre. Dense and abundant flower resources near nests are likely to be extremely important for efficient foraging and resiliant populations .

The Small Flecked Mining Bee (*Andrena coitana*) has only been recorded at two Cornish sites post 2010 (including Carn Glaze). Carn Glaze is north facing and quite exposed, which could fit with this picture. It has a clepto-parasite Flat-ridged Nomad Bee (*Nomada obtusifrons*) with possibly only one modern site in Cornwall. But more surveys are needed to establish any modern trends.

Other landscape scale factors could be important factors both nationally and in West Penwith. Upland acid grassland habitats are vulnerable to eutrophication (Plantlife 2017) and nutrient increases reduce flower quality in species rich grassland (Balfour et.al. 2025) . Small scale farming is difficult in West Cornwall with increased economic and subsidy pressures. Surveys in 2025 across the landscape (Saunders 2025) suggest under-grazed through agricultural abandonment more of an issue than intensive grazing. This could be a highly negative interaction with nutrient enrichment through atmospheric pollution and mild winters to increase succession to less diverse bracken habitat (Werkman ET.AL. 1996)

The recent acquisition by CWT of the abandoned Bartinney Downs (14ha) which is adjacent to the Bartinney meadows, is significant as it now has the main nest aggregations. Currently unmanaged, Bartinney Downs is 70% dense bracken and 30% heathland and acid grassland. If future management is similar to that of Carn Glaze on the other side of the hill, ie. Bracken cutting and summer grazing then its its highly likely that a heathland/acid grassland habitat mosaic will emerge with Tormentil as part of the plant community. The new acquisition is also topographically interesting for solitary bees as it contains both earth banks and WW2 bomb holes. The acquisition allows greater scope to safeguard for Tormentil Bee and other bee species.

Conclusion

It is suggested the Tormentil Nomad at Bartinney has been driven by fluctuations in nest availability interacting with weather.

The study does emphasise how important rotational bare ground creation is and how quickly features can become unsuitable. More work is needed to establish best practice for rotational bare ground/early successional creation. The author will identify bare ground creation areas during 2025 to be created in September/October 2025.

The CWT management plan has been effective to deliver flowers. Continued CWT management for a high abundance of flowers (200 per metre) and is highly important given the national importance of the populations and vulnerability of the species to a changing farming landscape and climate change.

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Appendix 1. Review of UK trends in climate and distribution

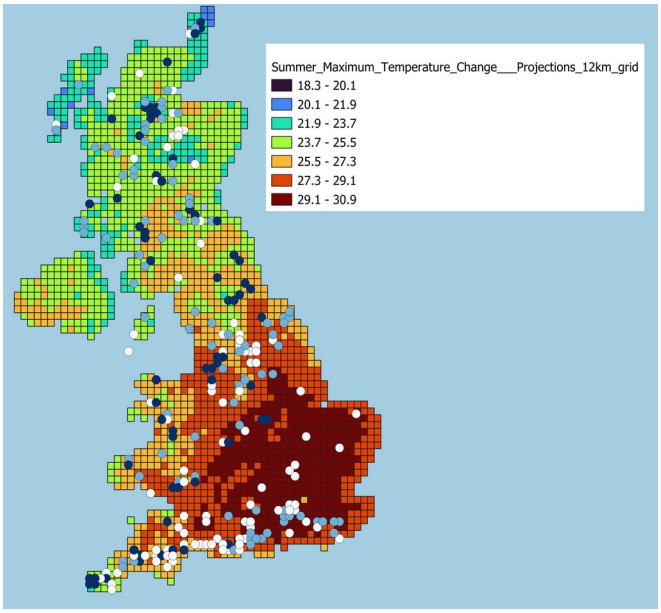


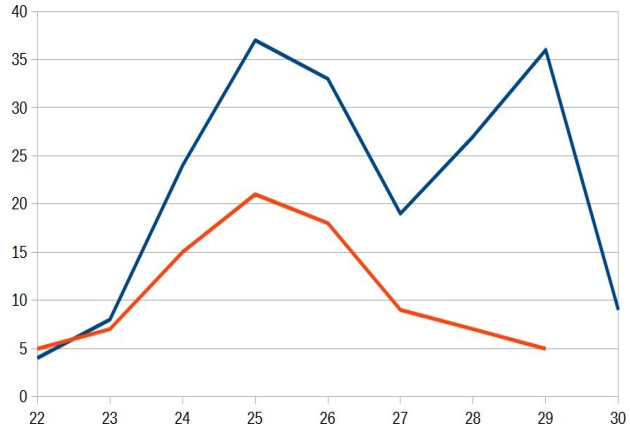
Figure 9: Tormentil Mining Bee (Andrena tarsata) records on the UKCP18 data set. Dark Blue dots represent post 2010 records

BWARS 10 km national data of The Small Flecked Mining Bee (*Andrena coitana*) and Tormentil Mining Bee (Andrena tarsata) was plotted on the highest daily maximum temperature from the summer (June-July-August) period averaged over a 1981-2000 baseline (Fig. 9.) (UKCP18 data set Met Office Hadley Centre 2023). The species data was joined to the climate data (Fig.10.). This review is provisional and more work is needed.

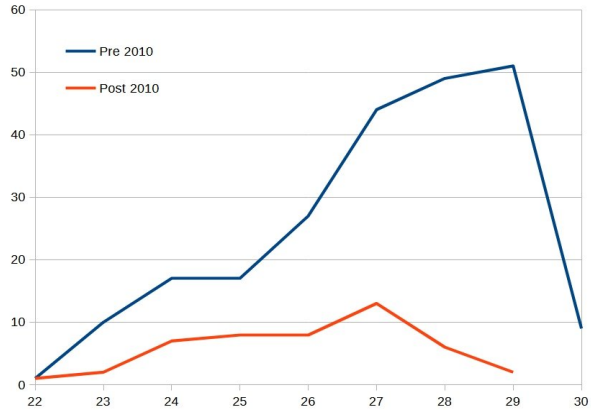
Fig 10. **Count of National BWARS (10km) locations joined to summer maximum temperature.**

Red= Post 2010 Blue= Pre 2010 records. Bottom axis is temperature.

Tormentil Mining Bee (Andrena tarsata)



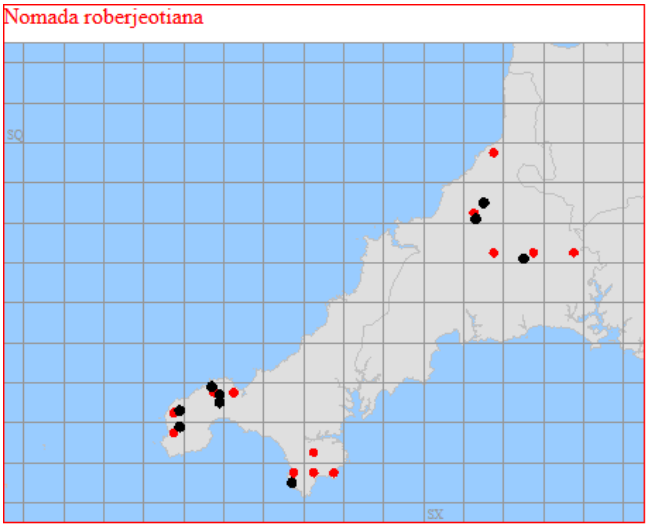
The Small Flecked Mining Bee (Andrena coitana)



Appendix 2. Background on important West Cornwall bee species

Tormentil Nomad Bee (Nomada robertjeotiana) and Tormentil Mining Bee (Andrena tarsata)

The Tormentil Mining Bee is a ground nesting bee which forages exclusively on Tormentil (Potentilla erecta) to provision its offspring. The Tormentil Nomad is a clepto-parasite which usurps the nest and provisions stored by the Tormentil Mining Bee. The nomad bee relies on a strong host population of the Tormentil Mining Bee (which is why it is such a rare bee). The Tormentil Mining Bee in Cornwall is widespread in upland or moorland habitats wherever there is tormentil. Whereas the nomad is more associated with sites with good population of the host and with larger bare ground features.



Picture 1: Distribution of Tormentil Nomad, Black dots post 2000's Red dots pre 2000's

The Tormentil Mining Bee *(A. tarsata)* is widespread across England, Wales and Scotland. However, BWARS data shows post 2000 recorded sites to have declined by about 50%. There are only 12 UK sites with recent RDB Tormentil Nomad Bee (*Nomada roberjeotiana*) records (BWARS 2020). Tormentil Nomad Bee (*N. roberjeotiana*) is listed as Near Threatened in the EU red list (Nieto 2014). The West Penwith area is probably of national importance, as it currently has more recorded sites for the Tormentil Nomad Bee (*N. roberjeotiana*) than anywhere else in the UK (Saunders 2015).

Perkin's Mining Bee (Andrena rosae)

Perkin's Mining Bee (Andrena rosae) has a very restricted distribution in the UK, was designated as RDB (Falk 1991) and is threatened or Red Data Book listed in five EU Countries (Fitzpatrick et al., 2006). The West Penwith area may support the strongest population of this bee in the UK (Saunders 2020). Spooner (1984) in his Cornish aculeate register notes that this bee "has become scarcer in recent years". The species occurs in two broods. The spring brood (March to May) is found associated with scrub edge habitats mainly with Blackthorn and Salix sp. Whereas the summer brood is mainly found on Angelica, but on some sites is associated with Bramble.

Small Flecked Mining Bee (Andrena coitana)

Picture 2: Small Flecked Mining Bee (Andrena coitana)

The find of Small Flecked Mining Bee (Andrena coitana) was particularly interesting,. The species was relatively widely recorded in Cornwall pre-2000's but I can only find it at one other site in Cornwall. The species is not listed in (Falk 1991) and needs modern update of its status. It is not listed as a flower specialist, but may be a climate vulnerable as generally Northern or Upland. The very rare Flat-ridged Nomad Bee (*Nomada obtusifrons*) associated with this bee is found at the other Cornish site. Flat-ridged Nomad Bee (*Nomada obtusifrons*) is listed as Near Threatened in European Red List (Nieto 2014).

Black-headed Mining Bee (*Andrena nigriceps*)

Black-headed Mining Bee (Andrena nigriceps) is listed as Nationally Scarce (Falk 1991) but these statuses are currently under review. Cornwall is a stronghold for this species, which is generally found in very small numbers or singletons. The bee is coastal but also a moorland species. Nationally this bee has had a large decline post 2000's (Saunders 2023). It is considered threatened in 5 European countries.

Catsear Nomad Bee (Nomada integra)

The Cats ear nomad bee (Nomada integra) and its host Cats ear mining bee (Andrena humilis) are both listed as Nationally Scarce (Falk 1991) but these statuses are currently under review. The Catsear Nomad Bee (Nomada integra) is quite a difficult bee to find and has very few modern records in Cornwall, but many of them being in West Cornwall. Its host is not particularly scarce in Cornwall. Both are associated with flower-rich habitats rich in Cat's Ears or Hawk-bits.

Appendix 3. Table 3. Key management aims for rare bees by habitat feature

Tormentil and Aster Lawns	Extensive grazing throughout the year can be effective at creating these habitats. Quite hard "traditional" farming methods such as burning heath and following up with grazing can be effective. Likely not to support the flower abundance of Tormentil meadows. Wetter Acid grassland likely to support higher Tormentil abundance, whereas drier areas can be richer in Yellow composites and Bird's Foot trefoils, also important for bees such as Catsear Nomad Bee (N. integra)
Tormentil and Aster Meadows	Reduced or no Summer grazing. A late hay-cut and winter grazing has been very effective at Bartinney at delivering a very high abundance of flowers 100 per sq. m. Wetter Acid grassland likely to support higher tormentil abundance, whereas drier areas can be richer in Yellow composites and Bird's Foot trefoils, also import for bees such as Catsear Nomad Bee (N. integra)
Bracken	Light grazing or rotational cutting of bracken can also deliver Tormentil and Aster Lawns of value to key species. The shelter may be important for microclimate for nesting for some species.
Angelica	Angelica is a highly important plant in West Penwith for invertebrates including Perkins Mining Bee. Angelica is vulnerable to preferential grazing, but needs some rotational disturbance to seed bed. Rotational cutting of areas and exclusion of stock to key stands of Angelica may be required. The plant in theory prefers wetter habitats but in West Penwith can colonise pretty much anywhere. Ruderal/ Scrub edge habitats with Angelica, Bramble and Hogweed also important for Black-headed Mining Bee (A. nigriceps) and other invertebrates.
Bare ground Permanent	Track-sides or Gates very important. Permanent poaching or disturbance should not be seen as problem. Not all bare ground the same if too compacted or rocky may not be suitable for mining bees. Likely to be dependant on soil type small particle size such as sand, silt and clay probably best
Bare ground	Rotational. Banks with friable or slightly sandy very important. These areas likely to need some management to insure bare ground coverage is maintained. On some sites high levels of grazing (probably in winter) may be enough. On others creating new bare areas by mechanical means or by hand with volunteers is needed. Ideally rotate a key section of bank to ensure a turn over of different successional stages.
Other flowers important	A range of heathland/ moorland flowers and habitats also important. Devils Bit Scabious very important for rare bees and providing late pollen resources, but scarce on sites. Eared Willow Male trees the most important of the Willow sp. And often more of limiting factor than other scrub types. Calluna and Erica rich heathland also important for bio-abundance supporting high numbers of widespread bee species and some localized specialists.

Appendix 4. Pictures of 2024 management at Bartinney Hay meadows

Picture 4: South facing bee bank refreshed by cattle 2024

Picture 3: South facing bee bank refreshed by cattle 2024

Picture 5: South facing bee bank refreshed by cattle 2024

Picture 6: South facing bee bank refreshed by cattle 2024

Picture 7: South facing bee bank refreshed by cattle 2024

Species recorded on the entire CWT Bartinney Downs complex

Taxon	Vernacular
Crabro cribrarius	Slender Bodied Digger Wasp
Crossocerus elongatulus	Slender Digger Wasp
Crossocerus varus	a digger wasp
Lindenius albilabris	a digger wasp
Tachysphex pompiliformis	a digger wasp
Cerceris ruficornis	a digger wasp
Ammophila sabulosa	Red Banded Sand Wasp
Andrena fucata	Painted Mining Bee
Andrena humilis	Buff-tailed Mining Bee
Andrena denticulata	Grey-banded Mining Bee
Andrena fuscipes	Heather Mining Bee
Andrena nigriceps	Black-headed Mining Bee
Andrena bicolor	Gwynne's Mining Bee
Andrena rosae	Perkins' Mining Bee
Andrena cineraria	Ashy Mining Bee
Andrena nigroaenea	Buffish Mining Bee
Andrena thoracica	Cliff Mining Bee
Andrena semilaevis	Shiny-margined Mini-miner
Andrena coitana	Small Flecked Mining Bee
Andrena angustior	Groove-faced Mining Bee
Andrena dorsata	Short-fringed Mining Bee
Andrena ovatula	Small Gorse Mining Bee
Andrena wilkella	Wilke's Mining Bee
Andrena tarsata	Tormentil Mining Bee
Panurgus banksianus	Large Shaggy Bee
Panurgus calcaratus	Small Shaggy Bee
Anthophora furcata	Fork-tailed Flower Bee
Bombus terrestris	Buff-tailed Bumblebee
Bombus hortorum	Small Garden Bumblebee
Bombus lapidarius	Red-tailed Bumblebee
Bombus barbutellus	Barbut's Cuckoo Bee
Bombus humilis	Brown Banded Carder
Bombus jonellus	Heath Bumblebee
Bombus pratorum	Early Bumblebee
Epeolus cruciger	Red-thighed Epeolus
Epeolus variegatus	Black-thighed Epeolus
Nomada fabriciana	Fabricius' Nomad Bee
Nomada flavoguttata	Little Nomad Bee
Nomada integra	Cat's-ear Nomad Bee
Nomada leucophthalma	Early Nomad Bee
Nomada panzeri	Panzer's Nomad Bee
Nomada roberjeotiana	Tormentil Nomad Bee
Nomada ruficornis	Fork-jawed Nomad Bee
Nomada rufipes	Black-horned Nomad Bee
Nomada striata	Blunt-jawed Nomad Bee
Colletes succinctus	Heather Colletes
Hylaeus brevicornis	Short-horned Yellow-face Bee
Halictus rubicundus	Orange-legged Furrow Bee
Halictus tumulorum	Bronze Furrow Bee
Lasioglossum punctatissimum	Long-faced Furrow Bee
Lasioglossum villosulum	Shaggy Furrow Bee
Lasioglossum leucozonium	White-zoned Furrow Bee
Lasioglossum albipes	Bloomed Furrow Bee
Sphecodes geoffrellus	Geoffroy's Blood Bee
Megachile centuncularis	Patchwork Leafcutter Bee
Megachile versicolor	Brown-footed Leafcutter Bee
Hedychrum niemelai	a cuckoo wasp
Caliadurgus fasciatellus	a spider-hunter wasp
Ancistrocerus scoticus	a mason wasp
Odynerus spinipes	Spiny Mason Wasp