

# Definition of Favourable Conservation Status for Round- mouthed Whorl Snail, *Vertigo genesii*

Defining Favourable Conservation Status Project

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## Acknowledgements

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## Contents

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About the DFCS project.....	4
1. Introduction.....	5
2. Summary favourable conservation status definition .....	6
3. Species definition and ecosystem context.....	6
4. Units .....	10
5. Evidence.....	10
6. Conclusions .....	17
Annex 1: References .....	18
Annex 2: Monitoring details from English <i>V.genesii</i> locations.....	20
Annex 3: <i>V. genesii</i> habitat.....	22

## About the DFCS project

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Natural England's Defining Favourable Conservation Status (DFCS) project is defining the minimum threshold at which habitats and species in England can be considered to be thriving. Our Favourable Conservation Status (FCS) definitions are based on ecological evidence and the expertise of specialists.

We are doing this so we can say what good looks like and to set our aspiration for species and habitats in England, which will inform decision making and actions to achieve and sustain thriving wildlife.

We are publishing FCS definitions so that you, our partners and decision-makers can do your bit for nature, better.

As we publish more of our work, the format of our definitions may evolve, however the content will remain largely the same.

This definition has been prepared using current data and evidence. It represents Natural England's view of FCS based on the best available information at the time of production.

# 1. Introduction

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## 1.1 Favourable Conservation Status Definition for Round-mouthed Whorl Snail, in England

This document sets out Natural England's view on Favourable Conservation Status (FCS) for *Vertigo genesii* in England. Favourable conservation status is defined in terms of three parameters: natural range and distribution; population; extent and quality of habitat necessary for long-term maintenance of populations.

Section 2 provides the summary definition of favourable conservation status in England. Section 3 covers contextual information, section 4 the units used and section 5 describes the evidence considered when defining favourable conservation status for each of the three parameters. Section 6 sets out the conclusions on favourable values for each of the three parameters. Annex 1 lists the references.

This document does not include any action planning, or describe actions, to achieve or maintain favourable conservation status. These will be presented separately, for example within strategy documents.

The guidance document [Defining Favourable Conservation Status in England](#) describes the Natural England approach to defining favourable conservation status.

## 2. Summary favourable conservation status definition

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### 2.1 Favourable Conservation Status in England

*Vertigo genesii* is a tiny (shell height: 1.7-1.9 mm) arctic-boreal snail species living in small colonies in calcium-rich spring-fed flushes in the north of England. It inhabits a dendritic network of runnels and seepages with a stony substrate. It was unknown in Britain until 1980 and is currently found in localised colonies in only two population centres in England.

### 2.2 Confidence

Favourable conservation status would require:

Favourable conservation status parameter	Favourable status	Confidence in the favourable value
Natural range and distribution	Maintenance of the current two population centres.	Low
Population	Maintenance of the existing seven populations and increase the incidence of the species within a further three principal flushes to qualify as populations.	Low
Supporting habitat	Maintenance of the existing suitable habitat and an increase of 15 ha in suitable habitat.	Moderate

## 3. Species definition and ecosystem context

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### 3.1 Species definition

Round-mouthed whorl snail, *Vertigo genesii*

The complete isolation of the two English population centres from each other, and from those in Scotland, suggests some genetic variation might exist, though this has not been examined. There are no known sub-species.

### 3.2 Species status

#### Red list status

An assessment of the threat of extinction.

- **Global: Least Concern** (Moorkens 2011)

- **European: Least Concern** (Cuttelod and others 2011)
- **GB: Near Threatened.** Criteria B2a (Seddon and others 2014)

### Conservation status

- Listed on Annex II of the Habitat Directive as a species of Community Interest whose conservation requires the designation of Special Areas of Conservation.
- Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

### 3.3 Life cycle

*Vertigo genesii* lives in small colonies in wet, open, calcium-rich, sometimes stony, spring-fed flushes and fen meadow. The water table is within 5 cm of the soil surface, but not above ground level. The species is highly dependent on maintenance of appropriate hydrological conditions.

*V. genesii* is an obligate species of alkaline fens and is found within the M10 NVC type in association with M37 and M38, in the transition zone between these NVC types, and frequently where there is deposition of marl and tufa.

The sites can vary in size from a few tens of square metres to greater than one hectare. The nature of the flushes is dendritic and therefore the area of suitable *V. genesii* habitat (permanently wet, base-rich) can often be very small (see Annex 3).

At Malham, one of the population centres, the optimal habitat is defined as: “Mosaic of flushed fen grassland, often with tufaceous ooze, with sedge/moss lawns and mounds 10-25 cm tall, containing species such as *Carex viridula*, *C. hostiana*, *C. dioica*, *Briza media*, *Equisetum palustre*, *Eleocharis quinquefolia*, *Eriophorum* spp., *Juncus articulatus*, *Selaginella selaginoides*, *Primula farinosa*, and the mosses *Drepanocladus* spp., *Campylium stellatum*, *Palustriella* spp.” (Killeen 2015b).

At the other population centre, Upper Teesdale, Killeen (2010) says: “The habitat mosaic in the flushes comprises cushions of mosses (particularly *Palustriella commutata*, *Drepanocladus revolvens* and *Campylium stellatum*), and patches of sward with short sedges (mostly *Carex viridula* ssp. *brachyrrhyncha*), and rushes (e.g. *Eleocharis quinqueflora*). Other characteristic plants include *Selaginella selaginoides*, *Saxifraga azoides* and *Primula farinosa*. The flushes and grassland are grazed by sheep and rabbits. The areas between the flushes comprise dry grassland with species such as *Molinia caerulea*, *Nardus stricta* and *Festuca rubra*, *Alchemilla* spp. and mosses (principally *Calliergon cuspidatum* and *Sphagnum* spp. which do not support the snail).”

In general, sites supporting *Vertigo genesii* are subject to light grazing.

Veronika Schenková and Michal Horsák, commenting on the central European range, consider it can “tolerate slightly less calcareous conditions as well, because in

Scandinavia it frequently inhabits fens with calcitolerant peat mosses of *Sphagno warnstorffii* - *Tomenthypnion* alliance.” (Schenková and Horsák 2013). This may have been similar to the habitat at Upper Teesdale, where pollen analysis of the Red Sike Moss revealed a *Quercus*-*Alnus* treescape 2,600 years BP (Lewthwaite 1999).

### 3.4 Supporting habitat

*Vertigo genesii* is a boreal and alpine species that is virtually restricted to the Alps and the mountains of central Scandinavia. It is present in Finland, Italy & Sweden within the EU member states. Records elsewhere have been questioned given the taxonomic difficulties involved in identification. The IUCN (Moorkens 2011) list the species as present in Finland; Germany; Italy; Latvia; Norway; Sweden; Switzerland and the United Kingdom (Great Britain). The European range, including new central European records, as given by Veronika Schenková and Michal Horsák (2013) is shown at Map 1.



Map 1: *V. genesii* European range. Adopted from Schenková & Horsák (2013). © 2013, American Malacological Bulletin. Reproduced with permission.

In the UK, it is found in calcareous flushes within Annex I Alkaline fens, which include rich assemblages of local plants, often with an arctic-alpine element, confirming the status of the species as a relict of the fauna and flora of the late glacial period. It is very local



throughout its range, and the UK populations are probably at the climatic edge of the species' range.

The species is at the southern limit of its UK range within England. It is much more widespread in Scotland but is absent from Ireland and Wales. The largest UK site (Tullach Hill) is of the order of 9 ha, however the combined area of the other Scottish sites in Perthshire and the Black Isle amount to less than 1 ha (Killeen 2013).

**Other sources:** JNCC SAC Species Accounts (2016); Cameron and others (2003).

## 4. Units

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### 4.1 Natural range and distribution

Population centres. That is, occupied named flush seepage or runnel channel complexes. This is the best measure given the very restricted occurrence of the species.

### 4.2 Population

The number of principal flush seepages or runnel channels (each seepage typically about 2-3 m across, with runnels being 0.25-0.5 m across) with population persistence and juvenile recruitment, evidenced by presence in at least 50% of samples.

Snail numbers fluctuate and cannot be used to assess trends, but rather population persistence and juvenile recruitment are more robust options. Detailed monitoring transects and sample points exist for each of these population centres. Methods are the same for both population centres, and monitoring baselines exist.

### 4.3 Habitat for the species

Hectare

## 5. Evidence

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### 5.1 Current situation

Natural range and distribution *Vertigo genesii* is currently only known from two population centres within England - Malham and Upper Teesdale. It is a rare species in a scarce habitat so it is likely that the actual range has remained relatively static. However, the known range could well be extended by the discovery of further populations as there are other locations where the habitat type can be found at a suitable latitude and/or altitude (see Map 3). Nonetheless discovery of new populations is not easy due to small size and difficulty in identification.

The species is unlikely to occur to the south of the current range, as it requires high altitude calcareous seepage systems with long persistence and continued favourable conditions. Searches in 2011 for *V. geyeri* in base-rich flushes in the southern Brecon Beacons did not record that species or *V. genesii* (Willing 2012).

**Sources:** Killeen (2013); Killeen (2004).

**Confidence:** Moderate-High



Map 2: Known UK distribution of *Vertigo genesii*. JNCC (2019). © Joint Nature Conservation Committee. Reproduced with permission.

## Population

The population centre at Malham was re-surveyed in 2015. The species is present in 5 principal flushes in 2 seepage sites. However, the species was only present in sufficient samples in the East of Street Gate flushes to qualify as populations.

**Great Close mire** - Present in 3 principal flushes;

**East of Street Gate** - 2 arms, with the larger flush area seeming to hold a stronger population.

The occupied Malham complex would now appear to be larger than that at Upper Teesdale. It holds a number of other hillside flushes, and it is possible that further populations may be found there, especially since a new one was easily added in 2015.

At Upper Teesdale *V genesii* is found in 5 principal flushes. Widdybank Fell: **Red Sike, Sand Sike, Wildscar Sike**. South of Tees: **Merrygill Beck, Cronkley Fell**.

Holwick Fell no longer holds this species, the survey of 2021 confirming its continued absence. It should be removed from any consideration of condition for *Vertigo genesii*.

Some small flush areas at Upper Teesdale are known not to hold it, but it is unclear if they ever did. Annex 2 details the transect and point sample data for the species locations, and the proportions holding the species. Although the monitoring protocol was developing and reaching a more optimal expression, presence of adults and juveniles in samples mostly exceeded 50%.

**Sources:** Killeen (2013) and subsequent synthesis of all sample count data by David Heaver from all available reports; Killeen (2015a); Killeen (2015b).

**Confidence:** Moderate-High

### Habitat for the species

The habitat is hard to measure given that the seepages, flushes and runnels are dispersed, dendritic, and not all suitable, leading to a patchy resource.

The flushes within the Malham population centre occupy approximately 17 ha but the whole flush area is not currently suitable as the species was only found in some samples. It is unclear if other seepages are suitable, as *Vertigo genesii* occupies a sub-set of those sometimes also occupied by *Vertigo geyeri*, and so seems to have a distinct niche. The occupied flush complex is estimated to be 1.5 ha in extent.

The Upper Teesdale flush complex is considered to occupy no more than 3 ha (Killeen 2015a). Merrygill Beck may be around 0.3 ha in habitat area, whilst Cronkley Fell rill may be 0.005 ha in extent. This centre was surveyed for flush vegetation structure in 2020 by Madden and O'Reilly.

This suggests an estimate for total English habitat extent is thus 4.8 ha.

**Sources:** Killeen (2015a); Killeen (2015b)

**Confidence:** Moderate-High, Killeen data compiled by David Heaver

### 5.2 Historical variation in the above parameters

In Britain, *Vertigo genesii* is a glacial relict that was frequent in the Late Glacial and Early Postglacial. The species forms part of the sub-fossil Assemblage Y of Preece (1988) and is found in the period between approximately 14,800-11,200 BP in, for example, sites in East Sussex in the Late Glacial Interstadial (Wilkinson 2011).

Postglacial climatic change and forest growth led to a dramatic contraction of its range and population. Living populations were unknown in Britain until 1980 when it was discovered in Sand Sike on Widdybank Fell. The larger Scottish population centres were discovered in 1998-99. In 1999, following a better understanding of the habitat used, Red Sike and

Wildscar Sike were added to the known English populations, Cronkely Fell in 2002 and Merrygill Beck in 2009.

The discovery of the Malham population centre by Adrian Norris in 2005 effectively doubled the known English range of this species (Norris 2010).

There is no data on the historical area of the supporting habitat so it is unclear whether the extent of habitat available for *Vertigo genesii* has declined. Alkaline fens are vulnerable to the negative impacts of drainage, eutrophication and changes to livestock grazing. The England favourable conservation status definition for alkaline fens notes that there is less information available on the loss of alkaline fen in the uplands but concludes there has been a decrease in extent and number of stands. The definition also notes that the quality of upland fens has declined with some of the core and distinctive species of upland alkaline fens declining. It is not known if the Cow Green Reservoir (constructed 1967-1971) destroyed any seepage sites as it is close to the Upper Teesdale populations.

Although *Vertigo genesii* appears to have very specific habitat requirements, and occupies only a subset of alkaline fens, given the pressures on the habitat it is possible that there has been a decline in the extent of suitable habitat. Consequently, there must be some uncertainty over whether there has been change in the actual range and populations of *V. genesii* as it is dependent on stable conditions in this habitat type.

**Other sources:** Killeen (2004)

**Confidence:** High

### 5.3 Future maintenance of biological diversity and variation of the species

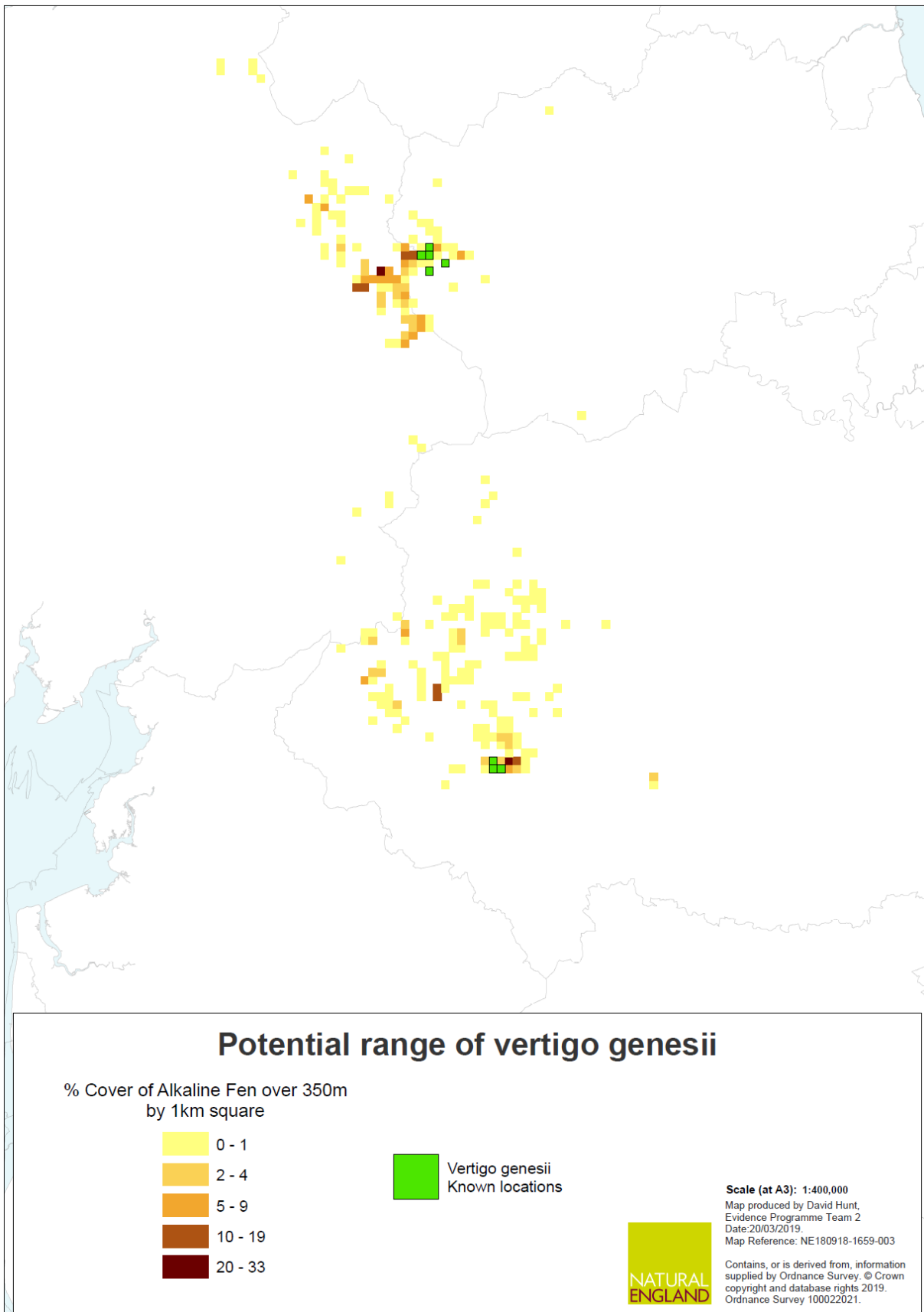
The small, isolated nature of the sites where this species survives makes the populations vulnerable to human induced change in hydraulic conditions, accidental damage or natural events such as prolonged drought. Heavy grazing is detrimental to the species so it is also vulnerable to inappropriate grazing management.

*V. genesii* is an arctic-boreal species, so climate changes resulting in increases in water temperature, or reduction in seepage flows, or pH changes affecting tufa deposition may be detrimental.

Upland flushes, fens and swamps have been assessed as having Medium sensitivity to climate change (Natural England & RSPB 2019). The habitat is likely to be affected by reduced water quality and increased seasonal variation in water table levels, including increased incidence of summer drought and heavy rain. Upland flushes, fens and swamps are likely to be less sensitive to changes in temperature as long as precipitation is sufficient to prevent drying out. The Manual notes that climate driven changes of management may have a greater impact on the habitat than climate change itself as they are especially sensitive to grazing and trampling.

The local climate around the Widdybank Fell area has been altered by the construction of the Cow Green Reservoir between 1967 and 1971. Lewthwaite (1999) noted that a classic "lake effect" is now in operation which buffers the environment, resulting, for example, in a reduction in the number of ground frosts. How much of that effect is due to the reservoir and how much results from climate change is unclear. Whether this impact is beneficial in the face of climate change impacts on an arctic-boreal species is unclear. If there is a species dependency on cooling, then a reduction of frost days, amplified by the lake effect, could be locally significant.

There are no known dispersal mechanisms for the species to be able to expand its range. Map 3 below shows the extent of alkaline fen over Carboniferous limestone above 350 m in altitude together with the known locations for *Vertigo genesii*. In reality, and given its apparent more specific habitat requirements, only a sub-set of these sites could be suitable for *Vertigo genesii*. Killeen (pers comm) surveyed parts of the Mickle Fell flushes which lie just to the south of the Upper Teesdale locations in 1999 and failed to find the snail. The map therefore represents the absolute maximum potential range for the species in England. It should be noted, however, that further north some Scottish populations can be found around sea-level as at Braelangwell Wood on the Black Isle, where the habitat is also more of a rich-fen meadow - spring mire in open woodland (Killeen and others 2019).



Map 3: Potential range of *Vertigo genesii* (Natural England 2019).

The species has been assessed as Near Threatened in Great Britain given its restricted range, the fragmented nature of the habitat and the small number of locations where it

occurs. Although this is a rare and range-restricted species occurring within a scarce habitat, there is no indication of decline, nor extreme fluctuation, in the English populations or their range and distribution. By contrast, it now appears to be absent from two of the seven sites in Scotland where it was recently present. Both the current English populations are within protected sites, as are all of the populations in Scotland. In order for this species to move to IUCN Least Concern within England, it is considered necessary to increase the resilience of the current populations and to increase the number of samples that the species is present in at the three Great Close Mire sites at Malham so that they qualify as populations. This could be achieved through optimal habitat management of the current population centres. Surveys to identify additional populations are desirable.

Within the two current population centres there is, potentially, a minimum area of 20 ha of habitat that is available and could be occupied. An additional 15 hectares of suitable habitat at Malham would mean that the whole fluvial resource is in better condition. Therefore, to support an increase in the current populations, the area of suitable habitat should be maximised.

**Sources:** Killeen (2013); Killeen (2004); Expert opinion (D. Heaver 2017)

**Confidence:** Moderate-High, High (supporting habitat).

#### 5.4 Constraints to expansion or restoration

There is no information on whether populations can be restored or new populations established.

At Great Close Mire, Malham, *V. genesii* does not occupy the central sector of the mire. Introduction of optimal management offers the potential to increase the population. Parts of the mire are affected by cattle grazing, with trampling noted over large parts of the flush and large parts of that mire surface lack the expected vegetation community. It is unclear if cessation of cattle transit would result in more suitable snail habitat being available or not but it seems worth reducing grazing pressure there. Cattle droving, as noted by Robert Goodison, is a historic feature, though it is debatable whether the large numbers of cattle, and the period of grazing, are optimal for snail habitat.

**Sources:** Expert opinion (D. Heaver 2017); Robert Goodison, NE pers comm, 2016; I Killeen 2021.

**Confidence:** Low



## 6. Conclusions

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### 6.1 Favourable range and distribution

Favourable status for the species requires maintenance of the two current known population centres.

### 6.2 Favourable population

Populations (as measured by presence of adults and evidence of juvenile recruitment) centred on 10 principal flushes, with *Vertigo genesii* present across at least 50% of the transect and point sample locations.

### 6.3 Favourable supporting habitat

The supporting habitat would be favourable when the extent is increased to 20 ha.

## Annex 1: References

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## Annex 2: Monitoring details from English *V.genesia* locations (Killeen, 2022)

Complex	Site	1980-1995	1996	1999	2002	2005	2006	2009	2014	2015	2021
Upper Teesdale	Sand Sike	1 location	2 locations	at all 11 points of transect	23 out of 33 samples, in 4 out of 7 dendritic arms of sand sike; transect bissects 2 arms	unsurveyed	unsurveyed	present in 7 out of 8 sampling zones	present in 3 out of 3 sampling zones	unsurveyed	Adult or sub-adult snails are present in all Optimal habitat areas
Upper Teesdale	Red Sike	not known	not known	4 locations	unsurveyed	unsurveyed	unsurveyed	present in 6/6 sampling zones	present in 2 out of 2 sampling zones	unsurveyed	Adult or sub-adult snails are present in all Optimal habitat areas
Upper Teesdale	Wildscar Sike	not known	not known	1 location	unsurveyed	unsurveyed	unsurveyed	present in 5 out of 5 sampling zones	present in 3 out of 3 sampling zones	unsurveyed	Adult or sub-adult snails are present in all Optimal habitat areas
Upper Teesdale	Merygill beck	not known	not known	not known	unsurveyed	Unsurveyed	unsurveyed	present in 4 out of 8 sampling zones	present in 3 out of 3 sampling zones	unsurveyed	Adult or sub-adult snails are present in all Optimal habitat areas
Upper Teesdale	Cronkely Fell	not known	not known	not known	Discovered by Colville & Killeen.	Unsurveyed	unsurveyed	Present in 3 out of 5 sampling zones	present in 2 out of 2 sampling zones	unsurveyed	Adult or sub-adult snails are present in all Optimal habitat areas

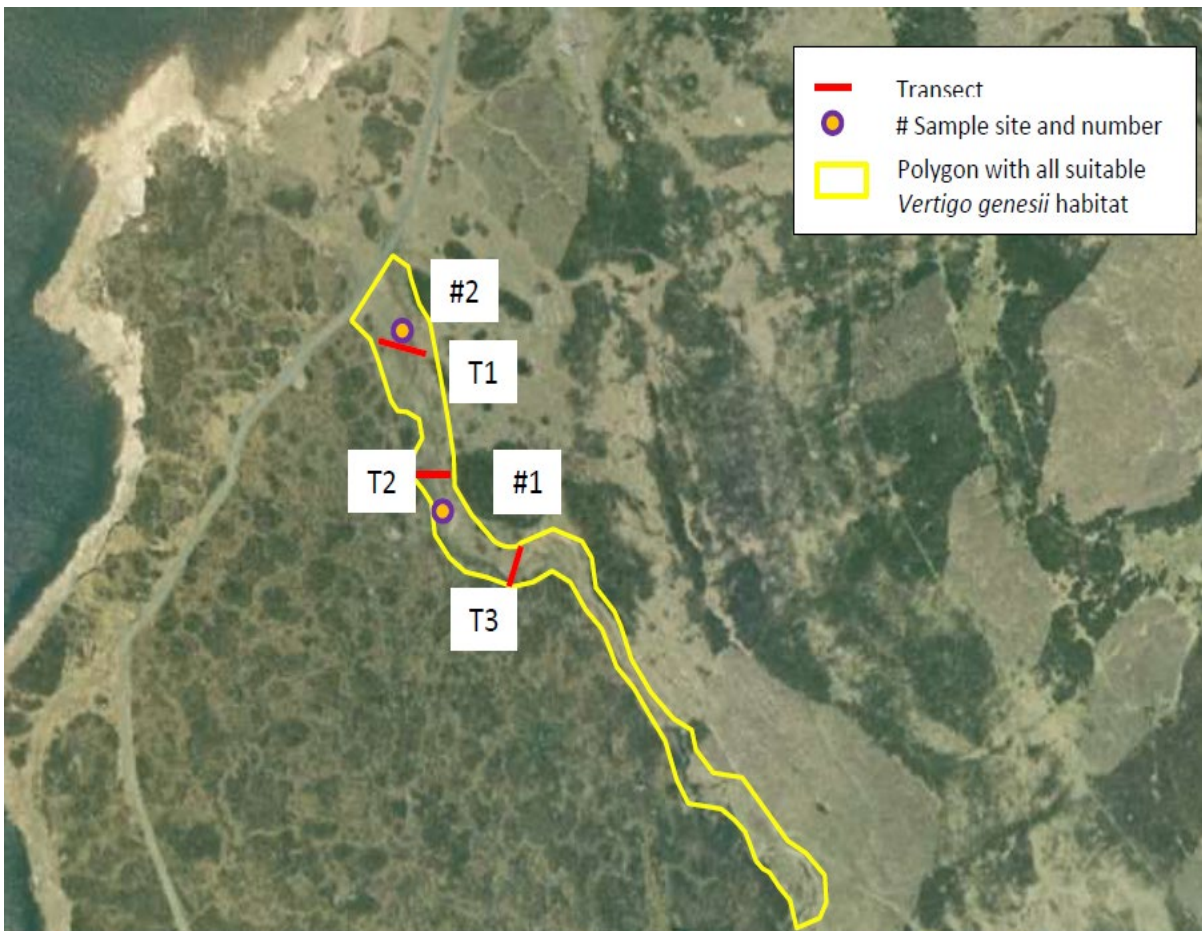
<b>Malham</b>	Great Close Mire	not known	not known	not known	not known	Population discovered by Norris.	unsurveyed	not known	not known	present in 2 out of 6 sampling zones-baseline	
<b>Malham</b>	East of Street gate	not known	not known	not known	not known	not known	present 6 out of 23 sampling zones.	unsurveyed	unsurveyed	present 7 out of 9 sampling zones, baseline	

## Annex 3: *V. genesii* habitat

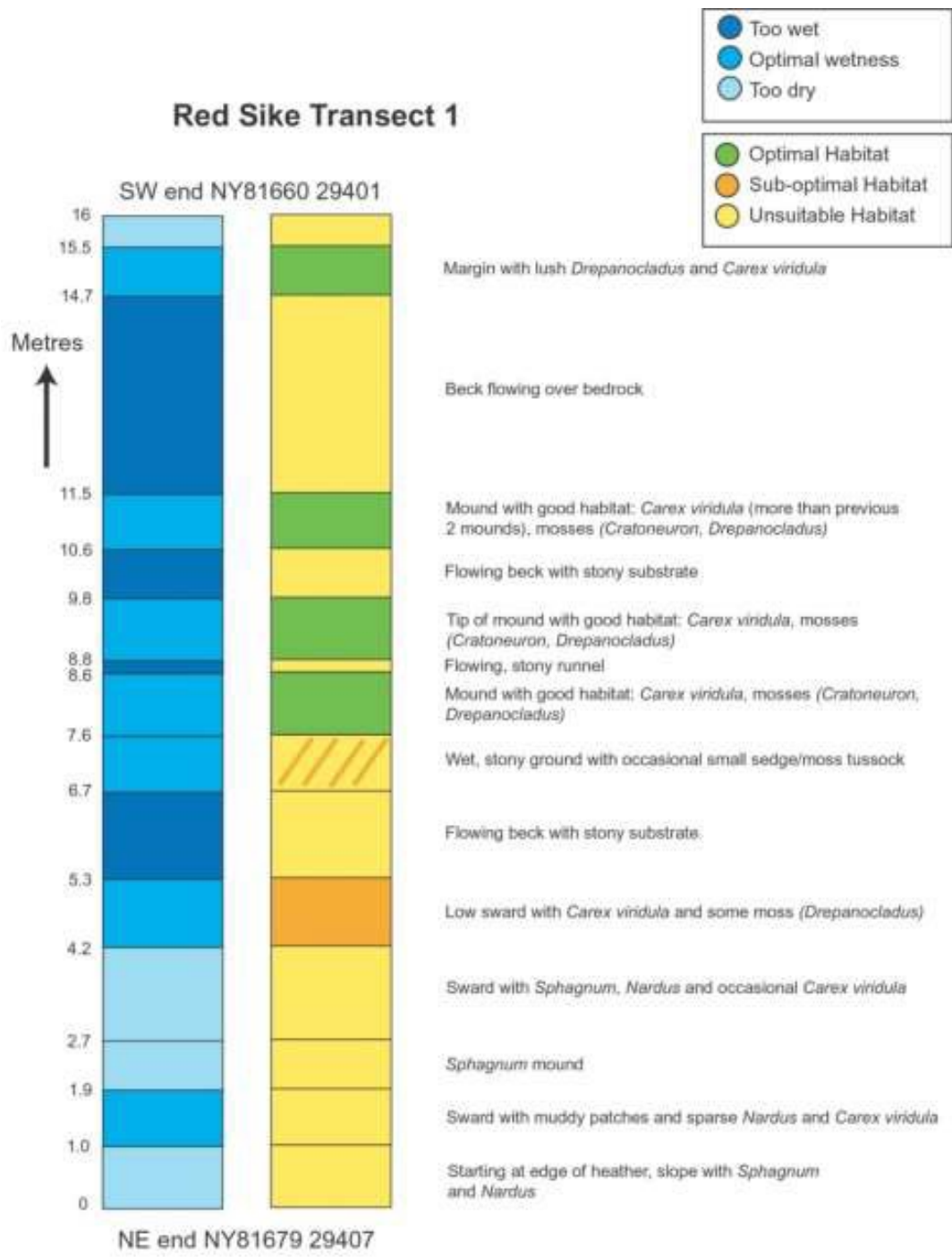
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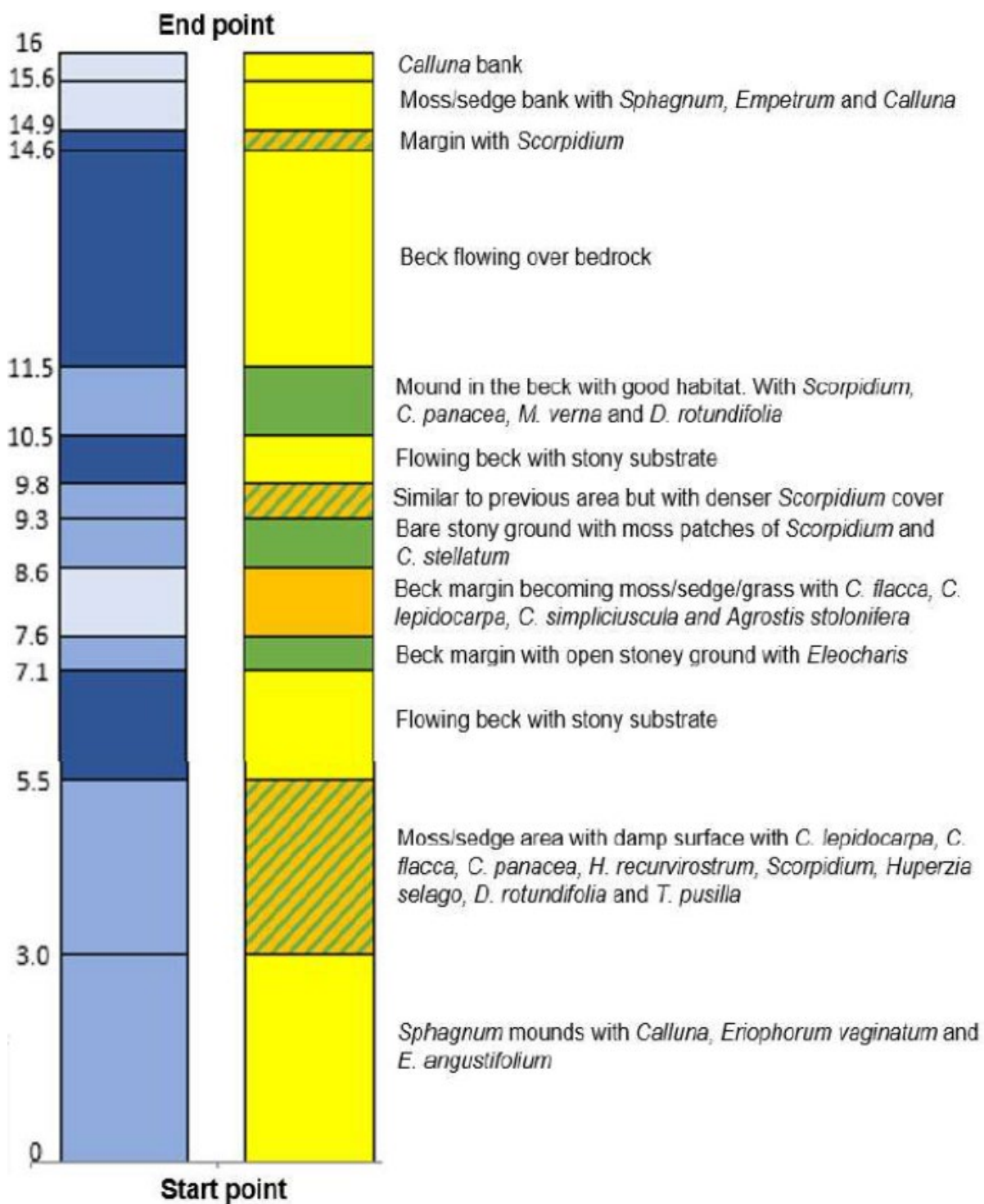
Optimal *genesii* runnel habitat (Killeen, 2022).



Red Sike – sample sites, habitat polygons and transects (Killeen, 2022).



Detail of 1 of the bespoke monitoring transects, Red Sike, Widdybank Fell, 2014 (Killeen, 2022).



Detail of 1 of the bespoke monitoring transects, Red Sike, Widdybank Fell, 2020 (Killeen, 2022).



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Natural England is here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

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Page 15 Map 3: Potential range of *vertigo genesii*. Natural England 2019. Scale (at A3): 1:400,000. Map produced by David Hunt, Evidence Programme Team 2, Natural England. Date 20/03/2019. Map Reference: NE180918-1659-0003. Contains, or is derived from, information supplied by Ordnance Survey, © British Crown Copyright and database rights 2019. Ordnance Survey 100022021.

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