European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC)

Fourth Report by the United Kingdom under Article 17

on the implementation of the Directive
from January 2013 to December 2018

Supporting documentation for the conservation status assessment for the species:

S1014 - Narrow-mouthed whorl snail (*Vertigo angustior*)

ENGLAND

IMPORTANT NOTE - PLEASE READ

- The information in this document is a country-level contribution to the UK Report on the conservation status of this species, submitted to the European Commission as part of the 2019 UK Reporting under Article 17 of the EU Habitats Directive.
- The 2019 Article 17 UK Approach document provides details on how this supporting information was used to produce the UK Report.
- The UK Report on the conservation status of this species is provided in a separate document.
- The reporting fields and options used are aligned to those set out in the European Commission guidance.
- Explanatory notes (where provided) by the country are included at the end. These provide an audit trail of relevant supporting information.
- Some of the reporting fields have been left blank because either: (i) there was insufficient information to complete the field; (ii) completion of the field was not obligatory; (iii) the field was not relevant to this species (section 12 Natura 2000 coverage for Annex II species) and/or (iv) the field was only relevant at UK-level (sections 9 Future prospects and 10 Conclusions).
- For technical reasons, the country-level future trends for Range, Population and Habitat for the species are only available in a separate spreadsheet that contains all the country-level supporting information.
- The country-level reporting information for all habitats and species is also available in spreadsheet format.

Visit the JNCC website, https://jncc.gov.uk/article17, for further information on UK Article 17 reporting.

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

NATIONAL LEVEL

1. General information

1.1 Member State	**UK (England information only)**
1.2 Species code	**1014**
1.3 Species scientific name	**Vertigo angustior**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Narrow-mouthed whorl snail

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2013-2018
2.3 Distribution map	Yes
2.4 Distribution map Method used	Complete survey or a statistically robust estimate
2.5 Additional maps	No

3. Information related to Annex V Species (Art. 14)

3.1 Is the species taken in the wild/exploited?	No	
3.2 Which of the measures in Art. 14 have been taken?	a) regulations regarding access to property	No
	b) temporary or local prohibition of the taking of specimens in the wild and exploitation	No
	c) regulation of the periods and/or methods of taking specimens	No
	d) application of hunting and fishing rules which take account of the conservation of such populations	No
	e) establishment of a system of licences for taking specimens or of quotas	No
	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens	No
	g) breeding in captivity of animal species as well as artificial propagation of plant species	No
	h) other measures	No

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3.3 Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit

b) Statistics/ quantity taken	Provide statistics/quantity per hunting season or per year (where season is not used) over the reporting period					
	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
Min. (raw, ie. not rounded)						
Max. (raw, ie. not rounded)						
Unknown	No	No	No	No	No	No

3.4. Hunting bag or quantity taken in the wild Method used

3.5. Additional information

BIOGEOGRAPHICAL LEVEL

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs

Atlantic (ATL)

4.2 Sources of information

Abrehart, T.R . Article 17 Survey Population & Condition Assessment of Vertigo angustior and Vertigo geyeri at three sites in north Norfolk. 2016, Abrehart Ecology. Report to Natural England.
Abrehart, T.R . Survey for Vertigo angustior in the Deben, Alde-Ore and Blyth Estuaries in light of the winter flooding 2013/14. November 2014. Abrehart Ecology. Report for Natural England.
Abrehart, T.R and Jackson, R.L. 2014. Survey of the aquatic invertebrate assemblage of Snape marshes and the presence of Narrow-mouthed whorl snail (Vertigo angustior) on Snape sea wall. An ecological survey including floral and faunal observations undertaken for the Environment Agency by Abrehart Ecology.
Abrehart T.R. 2014. Annex A: SAC status reporting on Vertigo moulinsiana in Norfolk and Sufolk 2014. An ecological survey including vegetation and invertebrates observations undertaken for Natural England by Abrehart Ecology. Extra Abrehart Data from EA and local authority contracts, with records retained on his database.
Improvement Programme for England's Natura 2000 Sites (IPENS) Site Improvement Plan: Norfolk Valley Fens. Natural England. 2014.
Killeen. I.J. A condition assessment of Vertigo angustior at Gait barrows, Cumbria. Report to Natural England. 2018
Cousins, M and Rowson, B (2017) Vertigo angustior DNA sequencing. Mollusc World, Nov 2017, Issue 45.
Thomas Spencer, Susan M.Brooks, Ben R.Evans, James A.Tempest & Iris Moller 2015. Southern North Sea storm surge event of 5 December 2013: Water levels, waves and coastal impacts.Earth-Science Reviews Volume 146, July 2015, Pages

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120-145.

5. Range

5.1 Surface area (km²)		
5.2 Short-term trend Period		
5.3 Short-term trend Direction	Stable (0)	
5.4 Short-term trend Magnitude	a) Minimum	b) Maximum
5.5 Short-term trend Method used		
5.6 Long-term trend Period		
5.7 Long-term trend Direction		
5.8 Long-term trend Magnitude	a) Minimum	b) Maximum
5.9 Long-term trend Method used		
5.10 Favourable reference range	a) Area (km²) b) Operator c) Unknown d) Method	
5.11 Change and reason for change in surface area of range	No change The change is mainly due to:	
5.12 Additional information	Although the survey effort for the 4th Article 17 report was more limited than the large amount of freely given data available for the 3rd report, the range has not markedly altered, although there have been some population losses within it.	

6. Population

6.1 Year or period	2013-2018	
6.2 Population size (in reporting unit)	a) Unit	number of map 1x1 km grid cells (grids1x1)
	b) Minimum	
	c) Maximum	
	d) Best single value	35
6.3 Type of estimate	Best estimate	
6.4 Additional population size (using population unit other than reporting unit)	a) Unit	number of map 10x10 km grid cells (grids10x10)
	b) Minimum	
	c) Maximum	
	d) Best single value	21
6.5 Type of estimate	Best estimate	
6.6 Population size Method used	Complete survey or a statistically robust estimate	
6.7 Short-term trend Period	2007-2018	
6.8 Short-term trend Direction	Decreasing (-)	

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6.9 Short-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval
6.10 Short-term trend Method used	Based mainly on extrapolation from a limited amount of data
6.11 Long-term trend Period	1994-2018
6.12 Long-term trend Direction	Decreasing (-)
6.13 Long-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval
6.14 Long-term trend Method used	Based mainly on extrapolation from a limited amount of data
6.15 Favourable reference population (using the unit in 6.2 or 6.4)	a) Population size b) Operator c) Unknown d) Method
6.16 Change and reason for change in population size	Genuine change The change is mainly due to: Genuine change
6.17 Additional information	

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	a) Are area and quality of occupied habitat sufficient (to maintain the species at FCS)?	Yes
	b) Is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)?	
7.2 Sufficiency of area and quality of occupied habitat Method used	Complete survey or a statistically robust estimate	
7.3 Short-term trend Period	2012-2018	
7.4 Short-term trend Direction	Decreasing (-)	
7.5 Short-term trend Method used	Complete survey or a statistically robust estimate	
7.6 Long-term trend Period	1994-2018	
7.7 Long-term trend Direction	Decreasing (-)	
7.8 Long-term trend Method used	Based mainly on extrapolation from a limited amount of data	
7.9 Additional information		

8. Main pressures and threats

8.1 Characterisation of pressures/threats

Pressure	Ranking
Sea-level and wave exposure changes due to climate change (N04)	H
Flooding (natural processes) (M08)	H

Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defences or coastal protection works and infrastructures) (F08)	M

Threat	Ranking
Sea-level and wave exposure changes due to climate change (N04)	H
Flooding (natural processes) (M08)	H
Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defences or coastal protection works and infrastructures) (F08)	H

8.2 Sources of information

Abrehart 2014
Abrehart 2014

8.3 Additional information

9. Conservation measures

9.1 Status of measures

a) Are measures needed? Yes

b) Indicate the status of measures Measures identified and taken

9.2 Main purpose of the measures taken

Maintain the current range, population and/or habitat for the species

9.3 Location of the measures taken

Only outside Natura 2000

9.4 Response to the measures

Medium-term results (within the next two reporting periods, 2019-2030)

9.5 List of main conservation measures

Adopt climate change mitigation measures (CN01)

Manage changes in hydrological and coastal systems and regimes for construction and development (CF10)

9.6 Additional information

A fair proportion of Vertigo angustior sites occur with protected sites, especially on the coastal sites and in some of the fen type sites, less so along the river valleys. Some effective liasion has already taken place between the Environment Agency's coastal flood defence teams on schemes potentially impacting V.angustior, and the more recent datasets of occurence will be made available to better inform mitigations. There have been issues over grazing pressure levels, and these need local resolution.

10. Future prospects

10.1 Future prospects of parameters

a) Range
b) Population
c) Habitat of the species

10.2 Additional information

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11. Conclusions

11.1. Range	
11.2. Population	
11.3. Habitat for the species	
11.4. Future prospects	
11.5 Overall assessment of Conservation Status	
11.6 Overall trend in Conservation Status	
11.7 Change and reasons for change in conservation status and conservation status trend	a) Overall assessment of conservation status No change The change is mainly due to: b) Overall trend in conservation status No change The change is mainly due to:
11.8 Additional information	

12. Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network (on the biogeographical/marine level including all sites where the species is present)	a) Unit	number of map 1x1 km grid cells (grids1x1)
	b) Minimum	4
	c) Maximum	5
	d) Best single value	4
12.2 Type of estimate	Best estimate	
12.3 Population size inside the network Method used	Based mainly on extrapolation from a limited amount of data	
12.4 Short-term trend of population size within the network Direction	Stable (0)	
12.5 Short-term trend of population size within the network Method used	Based mainly on extrapolation from a limited amount of data	
12.6 Additional information		

13. Complementary information

13.1 Justification of % thresholds for trends	
13.2 Trans-boundary assessment	
13.3 Other relevant Information	

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Distribution Map

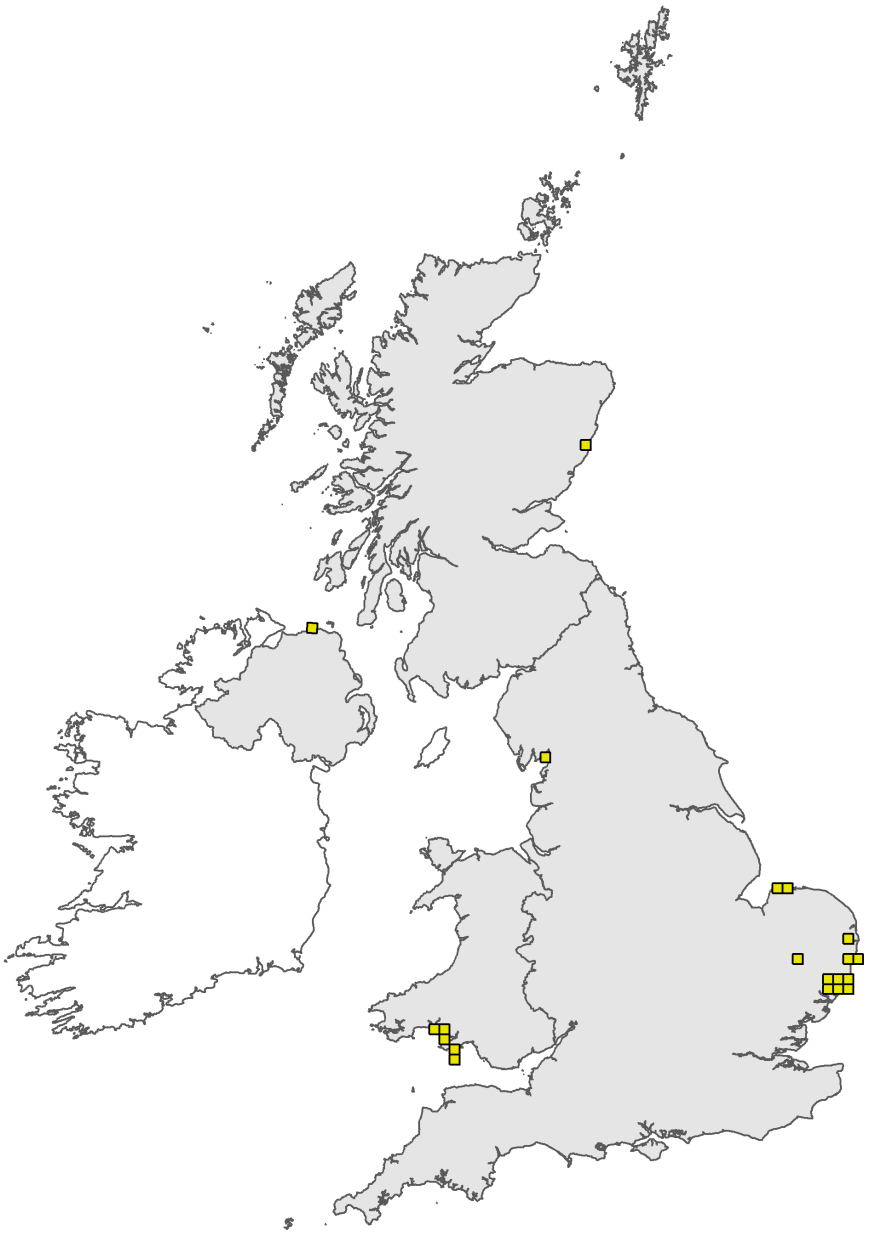

Figure 1: UK distribution map for S1014 - Narrow-mouthed whorl snail (*Vertigo angustior*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 10km grid square distribution map is based on available species records within the current reporting period. For further details see the 2019 Article 17 UK Approach document.

Range Map

Figure 2: UK range map for S1014 - Narrow-mouthed whorl snail (*Vertigo angustior*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The range map has been produced by applying a bespoke range mapping tool for Article 17 reporting (produced by JNCC) to the 10km grid square distribution map presented in Figure 1. The alpha value for this species was 20km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Species name: Vertigo angustior (1014)

Field label	Note
1.4 Alternative species scientific name	Recent work (Cousins & Rowson, 2017) has demonstrated that the isolated population at Gait Barows in NW England is in fact conspecific with the larger and more connected populations on the eastern coast of Norfolk and Suffolk. There was always some consideration that they might be distinct, but they are not.
2.5 Additional maps	An additional map has been produced to support the argument that the decline in coastal populations is entirely an artifact of less survey effort, and that the 4th A17 samples largely interpolate with the 3rd A14 report sites and are favourable for the species. This adds to the argument that the population along the coastal fringe is stable overall.

Species name: Vertigo angustior (1014) Region code: ATL

Field label	Note
6.10 Short term trend; Method used	Although there is a substantial drop between periods in numbers of both ten and one kilometre squares occupied, much of this is survey artifact. Large amounts of free and additional data were provided for the 3rd report, and lesser amounts for the 4th and in slightly different geographical locations. However, 17 one km squares share data between the 3rd and 4th periods, with 35 squares in the 4th report set against 55 in the 3rd. The spread of 4th report records well matches that in the 3rd report, and the 4th report populations, at least along the long coastal strip, are favourable, so the extrapolation suggests habitat constancy between the 2 reporting periods. The decline is relatively slight but real, and is centred on the estuarine and riparian locations.
6.14 Long term trend; Method used	Though the survey techniques have remained the same, the level of survey effort has generally increased over the long term period, revealing more of the true UK distribution of this species. It still remains incomplete, and it seems entirely feasable that it occurs along most of the Norfolk and Suffolk coastal strip. That said, populations that were discovered early on in the riparian and estuarine habitats have been impacted and lost or declined, so in the face of increases in knowledge there have been losses at locations. Hence the long-term trend has been one of some reduction.
6.17 Additional information	The extent of the surveyed reaches in Norfolk & Suffolk could not be repeated for this current report, though some limited survey has been possible at key sites, augmented by the results for surveyor surveys on a more ad hoc basis. 35 one kilometre squares were covered by survey, set against the bulk of the coastal survey sites in the 3rd period of 55 one kilometre squares. Despite this, comparison of the coverage over the English range between the two reporting periods shows that only the central coastal and upper inland Norfolk sites received no repeat survey, but that the north Norfolk sites, lower central Norfolk and lower coastal Norfolk sites all received enough coverage to allow the assertion of no habitat change and therefore no population change, to be made. So the bulk of that coastal population has remained stable whilst real losses have happened within the estuarine and associated riparian range.
7.1 Sufficiency of area and quality of occupied habitat	Since the bulk of the UK population is founded on the dense and rank coastal grasslands on the Norfolk and Suffolk coasts. There clearly is sufficient extent. More so when it is noted that the snail is able to live on both sides of sea walls, though the seaward side populations are always at greater risk. The relatively fewer riparian and estuarine populations still have habitat, though its quality has been in decline in the face of sea level rise impacts, and tidal surges. Overall then, an affirmative response can be given to this question.

7.9 Additional information	V. angustior is found primarily in open, damp habitats on friable soils that are kept moist by shading from moderately tall herbaceous or grassy vegetation. Although it requires microhabitats with high humidity levels it is not tolerant of deep or prolonged inundation. Drought causes the snails to retreat to within the soil and they are generally absent from habitats that have dry substrates for long periods of the summer. The vegetation may be grazed by livestock, although over-grazing can be detrimental. The detection of new populations on previously worked sites has increased the known range of this species. However, the ecological zone which this species requires seems too often be a narrow strip, so the area of useable habitat within its sites is often quite small. New survey work extended the known range on Holme Dunes NNR and large snail populations were again found at Burnham Overy Staithe. This is offset by the impacts from the tidal surge in December 2013-14 to the Deben and Alde-Ore estuaries on low-lying populations, where they are either driven to local extinction, or are pushed into higher elevation habitat, leading to habitat squeeze.
7.9 Additional information	The list below (extracted from Killeen & Moorkens 2003) gives descriptions of 5 levels of ground moisture. 1. DRY - no visible moisture on ground surface or detected if touched; 2. DAMP - ground visibly damp but water does not rise if pressed; 3. WET - water appears under light pressure; 4. VERY WET - pools of water present but < 5cm in depth; 5. SUBMERGED - whole sample site under water > 5cm in depth.
8.3 Additional information	Abrehart (2014) writes: The population of Vertigo angustior is under considerable threat in each of the estuaries in this study. The main efects causing the declines are the same for each estuary, these are sea wall repairs, coastal squeeze and increased tidal surges. The efects on the V. moulinsiana and Mercuria similis populations are coastal squeeze, lack of management, tidal surges and eutrophication from agricultural run-off. Within each estuary there is evidence of coastal squeeze. This was demonstrated most noticeably at Bromeswell Green in the Deben estuary were the population in 2008 was healthy and during this survey was all but extinct. Similar changes were noted at Suton and Chillesford. In the Blyth the population was noted at a considerably higher elevation to that in 2002. It was responding where possible and moving away from the saltmarshes. This habitat was limited at each of the 11 transects and in the future all these sites will not be suitable. The main impacts on these three species of the tidal surge will have been considerable. Each species occupies a narrow transitional habitat at each site. These habitats are often dictated by the delicate balance of fresh water and saline inluences. Where the habitat is stable these species can be found in great abundance, when the balance is tilted in the favour of saline the population is unable to into suitable habitat and crashes. This is what appears to be happening to V. angustior, the tidal surge of 5th December 2013 will have greatly speeded this process up. At the Deben estuary Woodbridge site, this surge was a maximum of 3.37m above the Newlyn datum (Spencer et al, 2015).
10.2 Additional information	The full range extent of this species on the Norfolk and Suffolk coasts is still only partially understood, but it appears to be extensive. Population losses through sea level rise will impact riparian and estuarine edge populations, but they are likley to persist on the coastal grasslands. The role of increased storm events under climate change on this habitat is unclear, as are the demands for coastal protection, though at least the latter are being managed with the Environment Agency.

12.6 Additional information	The habitat at Gait Barrows is not easily assessed by use of transects or permanent plot areas (e.g. 5m x 5m) due to the fragmented nature of the habitat. Therefore the habitat has been assessed using simple estimations of the quality and extent of the habitat at a number of different sample locations on each of the 2 main pavement areas. The habitat at each sample location was categorized into 3 classes according to its suitability for Vertigo angustior: - Optimal - a layer of live loose moss (growing on the pavement surface) and moss litter with some dead leaves, under shade of mainly yew and hazel at the transition margin between bare pavement and more heavily shaded scrub or woodland. The material lies and grows on top of the clints, sometimes in very shallow runnels, depressions or pock marks, with a patchy layer of soil no greater than 1cm deep and no standing water - Sub-optimal - Vegetation composition as above but with a higher proportion of dead leaves and pine needles, or there are low herbs and grasses growing in the transition margins, or there is standing water in the runnels and depressions - Unsuitable - Any other habitat. Survey at Flordon Common was not undertaken, though conservation action is proposed to establish the site's hydrological issues and its current match for angustior.