

Report under The Conservation of Habitats and  
Species Regulations 2017 (as amended),  
Regulation 9A

**2019-2024**

Conservation status assessment for the species:

**S1833 - Slender naiad**

***(Najas flexilis)***

**England**



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### **Important note - Please read**

- The information in this document represents the England Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A, for the period 2019-2024.
- It is based on supporting information provided by Natural England, which is documented separately.
- The Habitats Regulations reporting 2019-2024 Approach Document provides details on how this supporting information contributed to the UK Report and the fields that were completed for each parameter.
- Explanatory notes (where provided) are included at the end. These provide additional audit trail information to that included within the assessments. Further underpinning explanatory notes are available in the related country reports.
- 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; and/or (iii) the field was not relevant to this species (section 12 National Site Network coverage for Annex II species).

Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the [JNCC website](#).

## Assessment Summary: Slender naiad

**Table 1:** Table summarising the conservation status for S1833 - Slender naiad (*Najas flexilis*). Overall conservation status for species is based on assessments of range, population, habitat for the species, and future prospects.

### Overall Conservation Status (see section 11)

**Unfavourable-bad (U2)**

### Breakdown of Overall Conservation Status

<b>Range</b> (see section 5)	<b>Unfavourable-bad (U2)</b>
<b>Population</b> (see section 6)	<b>Unfavourable-bad (U2)</b>
<b>Habitat for species</b> (see section 7)	<b>Unfavourable-bad (U2)</b>
<b>Future Prospects</b> (see section 10)	<b>Unknown (XX)</b>

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## National Level

### 1. General information

1.1 Country	England
1.2 Species code	S1833
1.3 Species scientific name	<i>Najas flexilis</i>
1.4 Alternative species scientific name	
1.5 Common name	Slender naiad
Annex(es)	II, IV

### 2. Maps

2.1 Sensitive species	No
2.2 Year or period	
2.3 Distribution map	No
2.4 Distribution map; Method used	

#### 2.5 Additional information

No distribution map has been produced as there are no England records for this species since c1982

### 3. Information related to Annex V Species

#### 3.1 Is the species taken in the wild / exploited?

#### 3.2 What measures have been taken?

##### a) Regulations regarding access to property

##### b) Temporary or local prohibition on the taking of specimens in the wild and exploitation

##### c) Regulation of the periods and/or methods of taking specimens

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**d) Application of hunting and fishing rules which take account of the conservation of such populations**

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**e) Establishment of a system of licences for taking specimens or of quotas**

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**f) Regulation of the purchase, sale, offering for sale, keeping for sale, or transport for sale of specimens**

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**g) Breeding in captivity of animal species as well as artificial propagation of plant species**

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**Other measures**

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**Other measures description**

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

**a) Unit**

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**Table 2:** Quantity taken from the wild during the reporting period (see 3.3a for units). For species with defined hunting seasons, Season 1 refers to 2018/2019 (autumn 2018 to spring 2019), and Season 6 to 2023/2024. For species without hunting seasons, data are reported by calendar year: Year 1 is 2019, and Year 6 is 2024.

	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
<b>b) Minimum</b>	-	-	-	-	-	-
<b>c) Maximum</b>	-	-	-	-	-	-
<b>d) Unknown</b>	-	-	-	-	-	-

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**3.4: Hunting bag or quantity taken in the wild; Method used**

**3.5: Additional information**

No additional information

## Biogeographical Level

### 4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs ATL

#### 4.2 Sources of information

See section 14 References

### 5. Range

5.1 Surface area (km<sup>2</sup>) 0

5.2 Short-term trend; Period 2013-2024

5.3 Short-term trend; Direction Stable

5.4 Short-term trend;  
Magnitude

a) Estimated minimum

b) Estimated maximum

c) Pre-defined range

d) Unknown

e) Type of estimate

f) Rate of decrease

5.5 Short-term trend; Method used Complete survey or a statistically robust estimate

5.6 Long-term trend; Period 2000-2024

5.7 Long-term trend; Direction Stable

5.8 Long-term trend;  
Magnitude

a) Minimum

b) Maximum

c) Rate of decrease

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<b>5.9 Long-term trend; Method used</b>	Complete survey or a statistically robust estimate
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### 5.10 Favourable Reference Range (FRR)

a) Area (km <sup>2</sup> )	1.5
b) Pre-defined increment	
c) Unknown	No
d) Method used	Expert opinion
e) Quality of information	high

### 5.11 Change and reason for change in surface area of range

a) Change	No
b) Genuine change	
c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	
g) Main reason	

### 5.12 Additional information

If the population were to become self sustaining at Esthwaite, (the only known site historically (until c.1982 for the species in England) once again as a result of water quality improvement this could be construed as matching the previous extent and could be used as the basis for calculating favourable reference range. Therefore, whilst the range mapping tool has not been deployed here, the FRR is given as the surface area of Esthwaite Water (1.5km<sup>2</sup>).

## 6. Population

<b>6.1 Year or period</b>	2010-2024
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### 6.2 Population size (in reporting unit)

<b>a) Unit</b>	number of localities
<b>b) Minimum</b>	
<b>c) Maximum</b>	
<b>d) Best single value</b>	0
<b>6.3 Type of estimate</b>	Best estimate
<b>6.4 Quality of extrapolation to reporting unit</b>	high
<b>6.5 Additional population size (using population unit other than reporting unit)</b>	
<b>a) Unit</b>	
<b>b) Minimum</b>	
<b>c) Maximum</b>	
<b>d) Best single value</b>	
<b>e) Type of estimate</b>	
<b>6.6 Population size; Method used</b>	Complete survey or a statistically robust estimate
<b>6.7 Short-term trend; Period</b>	2013-2024
<b>6.8 Short-term trend; Direction</b>	Stable
<b>6.9 Short-term trend; Magnitude</b>	
<b>a) Estimated minimum</b>	
<b>b) Estimated maximum</b>	
<b>c) Pre-defined range</b>	
<b>d) Unknown</b>	
<b>e) Type of estimate</b>	
<b>f) Rate of decrease</b>	
<b>6.10 Short-term trend; Method used</b>	Complete survey or a statistically robust estimate
<b>6.11 Long-term trend; Period</b>	

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**6.12 Long-term trend;  
Direction**

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**6.13 Long-term trend;  
Magnitude**

**a) Minimum**

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**b) Maximum**

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**c) Confidence interval**

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**d) Rate of decrease**

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**6.14 Long-term trend; Method  
used**

**6.15 Favourable Reference Population (FRP)**

**a) Population size** 1

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**a) Unit** number of localities

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**b) Pre-defined increment**

---

**c) Unknown** No

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**d) Method used** Expert opinion

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**e) Quality of information** high

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**6.16 Change and reason for change in population size**

**a) Change** No

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**b) Genuine change**

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**c) Improved knowledge or  
more accurate data**

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**d) Different method**

---

**e) No information**

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**f) Other reason**

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**g) Main reason**

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**6.17 Additional information**

Esthwaite Water SSSI is the only known site to have historically supported this species in England and furthermore Bishop (2019) reported that *N. flexilis* seeds were found in abundance in lake sediment cores, in association with indicators of a clear, oligo-mesotrophic, mildly alkaline lake, until disappearance due to eutrophication in the 1980's. Therefore the FRP can therefore be taken as one locality in England where, when environmental conditions, were suitable the population was self sustaining.

**6.18 Age structure, mortality and reproduction deviation** Yes, strongly deviating from normal

## 7. Habitat for the species

### 7.1 Sufficiency of area and quality of occupied habitat (for long-term survival)

a) Is area of occupied habitat sufficient? Yes

b) Is quality of occupied habitat sufficient? No

c) If No or Unknown, is there a sufficiently large area of unoccupied habitat of suitable quality? No

### 7.2 Sufficiency of area and quality of occupied habitat; Method used

a) Sufficiency of area of occupied habitat; Method used Complete survey or a statistically robust estimate

b) Sufficiency of quality of occupied habitat; Method used Complete survey or a statistically robust estimate

7.3 Short-term trend; Period 2013-2024

7.4 Short-term trend; Direction Uncertain

7.5 Short-term trend; Method used Based mainly on extrapolation from a limited amount of data

7.6 Long-term trend; Period 2000-2024

7.7 Long-term trend; Direction Uncertain

**7.8 Long-term trend; Method used**

Based mainly on extrapolation from a limited amount of data

**7.9 Additional information**

The area of standing open water is available but the water quality remains unsuitable despite recent measures to reduce nutrient inputs which have been partially successful. Further catchment wide measures are needed before the water quality is likely to become more suitable. Even if the quality of water supply is completely addressed, the issue of the sediment within the lake releasing nutrients is still a major factor determining habitat quality. Buried seed has been found in sediment cores, (Bishop, 2019) but the germination viability of the seed is unknown and testing is recommended. In any case the seed bank is buried under a significant depth of the nutrient rich accumulated sediment which will remain a physico-chemical hindrance to species recovery until techniques are developed to address this issue.

**8. Main pressures**

**8.1 Characterisation of pressures**

**Table 3:** Pressures affecting the species, including timing and importance/impact ranking. Pressures are defined as factors acting currently and/or during the reporting period (2019–2024). Rankings are: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Pressure	Timing	Ranking
PA17: Agricultural activities generating pollution to surface or ground waters (including marine)	Ongoing and likely to be in the future	High (H)
PB19: Forestry activities generating pollution to surface or ground waters (including marine)	Ongoing and likely to be in the future	Medium (M)
PF07: Residential and commercial activities and structures generating pollution to surface or ground waters	Ongoing and likely to be in the future	Medium (M)
PI01: Invasive alien species of Union concern	Ongoing and likely to be in the future	Medium (M)
PJ01: Temperature changes and extremes due to climate change	Ongoing and likely to be in the future	Medium (M)
PK01: Mixed source pollution to surface and ground waters (limnic and terrestrial)	Ongoing and likely to be in the future	High (H)

## 8.2 Sources of information

See section 14 References

## 8.3 Additional information

No additional information

## 9. Conservation measures

### 9.1: Status of measures

<b>a) Are measures needed?</b>	Yes
<b>b) Indicate the status of measures</b>	Measures identified and taken
<b>9.2 Main purpose of the measures taken</b>	Restore the habitat of the species (related to 'Habitat for the species')
<b>9.3 Location of the measures taken</b>	Only outside National Site Network
<b>9.4 Response to measures</b>	Long-term results (after 2036)

### 9.5 List of main conservation measures

**Table 4:** Key conservation measures addressing current pressures and/or anticipated threats during the next two reporting periods (2025–2036). Measures are ranked by importance/impact: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Conservation measure	Ranking
MA10: Reduce/eliminate point or diffuse source pollution to surface or ground waters (including marine) from agricultural activities	High (H)
MF08: Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats).	Medium (M)
MS03: Restoration of habitat of species from the directives	High (H)
MB10: Reduce diffuse or point source pollution to surface or ground waters (incl. marine) from forestry activities	Medium (M)
MJ02: Implement climate change adaptation measures	Medium (M)
MS02: Reintroduce species from the directives	Medium (M)

## 9.6 Additional information

Further catchment wide measures are needed to address diffuse water pollution at the previously known location, and once suitable water quality is achieved, species specific conservation measures are likely to be needed to restore the population to Esthwaite Water due to the depth that seed is buried under nutrient rich sediment and lack of certainty of germination viability of this seed. Techniques to remove the excess nutrient rich sediment and re-expose the seedbank need to be fully explored before the possibility of in-situ regeneration from seed can be completely eliminated prior to considering translocation of seed/propagules sourced from Scotland.

## 10. Future prospects

### 10.1a Future trends of parameters

<b>ai) Range</b>	Overall stable
<b>bi) Population</b>	Overall stable
<b>ci) Habitat for the species</b>	Positive - slight/moderate improvement

### 10.1b Future prospects of parameters

<b>aii) Range</b>	Poor
<b>bii) Population</b>	Poor
<b>cii) Habitat for the species</b>	Poor

## 10.2 Additional information

Even if the difficult issues of diffuse water pollution in the catchment are resolved and the quality of water supply is completely reliable, achieving appropriate water quality is still likely to rely on removal or other techniques for reducing the impact of nutrient rich lake sediment in the short term. There is an outflow from the mere so there will be some turnover and flux in Phosphorus and possible eventual return to more meso/oligotrophic conditions but this is likely to take a considerable period of time even when water supply quality is adequate. In-situ regeneration of seed is unlikely (due to buried seed depth and uncertain viability) but needs to be eliminated as an option before considering introduction of propagules from extant Scottish populations once the habitat is deemed suitable.

## 11. Conclusions

**11.1 Range** Unfavourable-bad (U2)

**11.2 Population** Unfavourable-bad (U2)

**11.3 Habitat for the species** Unfavourable-bad (U2)

**11.4 Future prospects** Unknown (XX)

**11.5 Overall assessment of Conservation Status** Unfavourable-bad (U2)

**11.6 Overall trend in Conservation Status** Unknown

### 11.7 Change and reason for change in conservation status

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

### 11.7 Change and reason for change in conservation status trend

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

### 11.8 Additional information

Previously unfavourable-inadequate when reported at UK level, and is now unfavourable-bad when disaggregated to England level. Water quality, which had shown some improvement at last reporting round, is still too poor to support the species and further changes need to be implemented before there is any real prospect of species recovery at the previous existing site. It will take time for these measures to take effect at Esthwaite Water even if voluntary measures are taken up at sufficient scale in the catchment. In order to re-establish an England population in the short term, and/or to supplement any successful recovery at Esthwaite Water, other sites could be established based on suitable habitat conditions and outcomes of trial propagation and conservation translocation techniques.

## 12. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex II species

### 12.1 Population size inside the pSCIs, SCIs and SACs network

a) Unit

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b) Minimum

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c) Maximum

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d) Best single value

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### 12.2 Type of estimate

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12.3 Population size inside the network; Method used

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12.4 Short-term trend of population size within the network; Direction

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12.5 Short-term trend of population size within the network; Method used

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12.6 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Direction

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12.7 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Method used

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### 12.8 Additional information

Not applicable - no SAC designated for this species as it has not been present in England since the Directive came into force.

## 13. Complementary information

### 13.1 Justification of percentage thresholds for trends

No justification information

### **13.2 Trans-boundary assessment**

No trans-boundary assessment information

### **13.2 Other relevant information**

No other relevant information

## 14. References

### Biogeographical and marine regions

#### 4.2 Sources of information

BSBI Distribution database (Accessed January 2025)

Bishop, I. J., Bennion, H., Sayer, C. D., Patmore, I. R. and Yang, H. 2019 'Filling the 'data gap': Using paleoecology to investigate the decline of *Najas flexilis* (a rare aquatic plant).' *Geo-Geography and Environment*, e00081.

Darwell, A., 2024 'Esthwaite Water SSSI Condition Monitoring: Macrophytes', DAL PROJECT REF 06123, draft 1 REPORT Darwell Associates, Penrith, Cumbria, unpublished report for Natural England.

Gunn, I. D. M. & Carvalho L., 2020 'Slender Naiad (*Najas flexilis*) Habitat Quality Assessment.' CRW2018\_27. Scotland's Centre of Expertise for Waters (CREW). Available online at: [crew.ac.uk/publications](http://crew.ac.uk/publications)

Lawrie, E., 2021 'Information Paper Slender Naiad – recovery plan.' NatureScot SCIENTIFIC ADVISORY COMMITTEE, SAC/2021/03/Info03,

Stroh, P.A., Humphrey, T.A., Burkmar, R.J., Pescott, O.L., Roy, D.B., & Walker, K.J., 2023 *Najas flexilis* (Willd.) Rostk. & W.L.E. Schmidt in BSBI Online Plant Atlas 2020, <https://plantatlas2020.org/atlas/2cd4p9h.1hc> (Accessed January 2025)

### Main pressures

#### 8.2 Sources of information

No sources of information

## 15. Explanatory Notes

Field label	Note
2.1: Sensitive species	With no records in England since c1982 this unobtrusive species is not currently threatened by collection.
2.4: Distribution map; Method used	No records so map for England blank. The plant is no longer present at its single former English locality, Esthwaite Water, where it was last recorded in c1982.
2.3: Distribution map	Data from BSBI Distribution database (Accessed January 2025). The known site in England (Esthwaite Water) has been surveyed during the reporting round (Darwell, 2023) and sediment cores have been taken to search for a seed bank. Generally, Esthwaite Water has been intensively surveyed for its aquatic macrophytes so there is confidence that the absence of records for <i>Najas flexilis</i> , combined with knowledge of past and ongoing pressures on the habitat, equates to absence of the species.
5.3: Short-term trend; Direction	There are no English records of the <i>Najas flexilis</i> during the period covered by the Directive.
5.11: Change and reason for change in surface area of range	There are no English records of the plant during the period covered by the Directive so no change in range.
6.2: Population size	No records in English site since c1982.
6.3: Type of estimate	Best estimate as the species has been searched for and not found in the reporting round.
6.8: Short-term trend; Direction	Remains stable on zero.
7.1: Sufficiency of area and quality of occupied habitat	The water quality at the single known (historic) English locality became too poor for this species, which requires oligotrophic systems. The water quality has been improving since measures were put into place by NE, but it is still not believed to be good enough to support this species (Gunn & Cavalho, 2020). Thus habitat quality is insufficient (rather than area). Whether there are other lakes in England that do have suitable habitat for this species is unknown, but is considered unlikely as it has never been recorded from

	<p>other sites (which therefore are presumed not to have been suitable for it, although it is possible the species might just have never reached them).</p>
7.4: Short-term trend; Direction	<p>Water quality is slowly improving in Esthwaite Water, with the reduction in external nutrient loading resulting in a decline in total phosphorus (TP) and a slight improvement in Secchi depth, although phytoplankton levels failed to show an improvement 2010-2015 (Gunn &amp; Cavalho, 2020).</p>
6.12: Long-term trend; Direction	<p>There will only be a sufficiency of habitat in terms of quality if present trends for improvement continue into the long term. The legacy of nutrients that have accumulated in the lake sediments will remain a problem for a considerable period of time, as nutrients can continue to be released from the sediments, especially under warm weather conditions, into the overlying open water.</p>
9.1: Status of measures	<p>Measures have been undertaken: closure of the local fish farm; upgrading of the sewage treatment works; the cessation of fish stocking; agri-environment scheme land management measures in the catchment and catchment sensitive farming initiatives.</p>
9.4: Response to the measures	<p>Some improvements have been noted but sufficient improvement in water quality overall is a long-term objective.</p>
10.1: Future trends and prospects of parameters	<p>Diffuse pollution sources is probably now the main threat to water quality and is the most difficult to address. More nutrient-rich conditions alters the balance of aquatic macrophytes, for example favouring the non-native <i>Elodea nuttallii</i>, which is present at the site. <i>Elodea</i> was still at 84% and 85 % abundance in wader and boat survey respectively in 2014, but was less prevalent in 2023 (Darwell, 2023). Even if water quality was to improve to the mesotrophic or oligo-mesotrophic conditions typically favoured by <i>N. flexilis</i>, the ongoing presence of species like <i>Elodea nuttallii</i> could prevent successful re-establishment of <i>N. flexilis</i> in Esthwaite Water.</p>

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12.1: Population size  
inside the pSCIs, SCIs  
and SACs network

Not applicable - no SAC designated for this species as it has not been present in England since the Directive came into force. However, Esthwaite Water SSSI, the only known previous location, is a Ramsar site qualifying under Criterion 1a because it is a particularly good example of a mesotrophic lake and under Criterion 2a because it contains nationally rare plant (*Najas flexilis*) and other restricted species.