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

2019-2024

Conservation status assessment for the species:

S6284 - Natterjack toad

(*Epidalea calamita*)

Wales

Cyfoeth Naturiol Cymru
Natural Resources Wales

JNCC

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Important note - Please read

- The information in this document represents the Wales 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 Resources Wales, 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.
- Maps showing the distribution and range of the species are included.
- 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: Natterjack toad

Distribution Map

Range Map

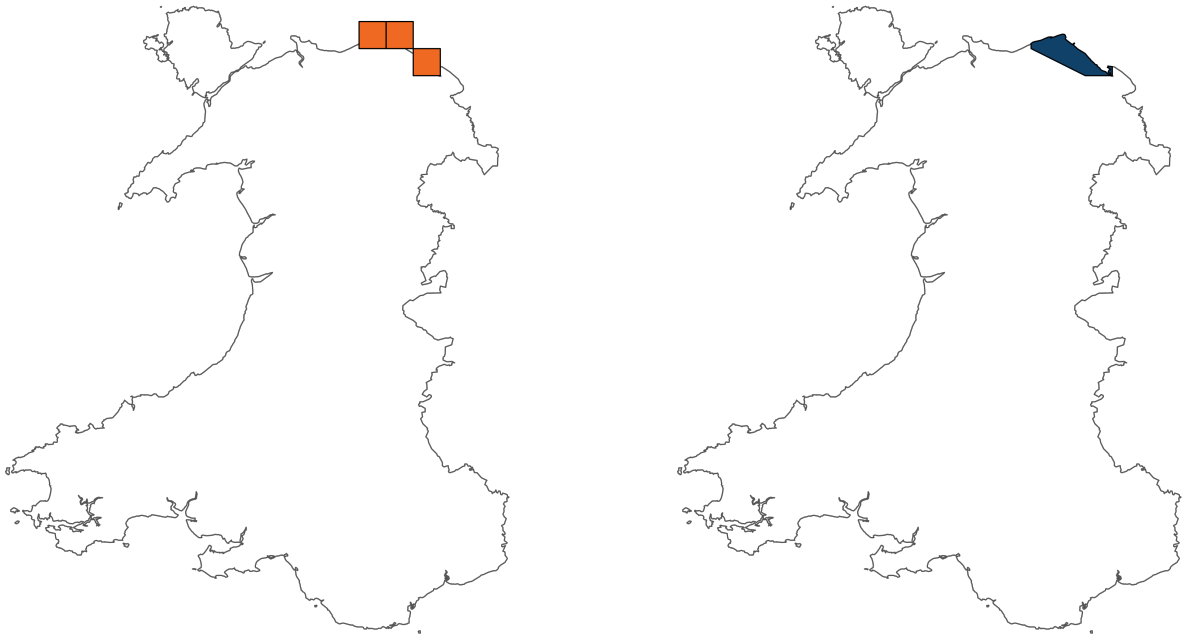

Figure 1: Wales distribution and range map for S6284 - Natterjack toad (*Epidalea calamita*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 10km grid square distribution map is based on available species records within the current reporting period.

Table 1: Table summarising the conservation status for S6284 - Natterjack toad (*Epidalea calamita*). 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

Range (see section 5)	**Unfavourable-inadequate (U1)**
Population (see section 6)	**Unfavourable-bad (U2)**
Habitat for the species (see section 7)	**Favourable (FV)**
Future prospects (see section 10)	**Unfavourable-bad (U2)**

List of Sections

National Level

1. General information

1.1 Country	Wales
1.2 Species code	S6284
1.3 Species scientific name	*Epidalea calamita*
1.4 Alternative species scientific name	
1.5 Common name	Natterjack toad
Annex(es)	IV

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2019-2024
2.3 Distribution map	Yes
2.4 Distribution map; Method used	Complete survey or a statistically robust estimate

2.5 Additional information

No additional information

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

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

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

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

Other measures

Other measures description

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

a) Unit

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) Minimum	-	-	-	-	-	-
c) Maximum	-	-	-	-	-	-
d) Unknown	-	-	-	-	-	-

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 (km²)	192.32
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	
5.7 Long-term trend; Direction	
5.8 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Rate of decrease	

5.9 Long-term trend; Method used	

5.10 Favourable Reference Range (FRR)

a) Area (km²)	
b) Pre-defined increment	Current range is between 2% and 10% smaller than the FRR
c) Unknown	No
d) Method used	Expert opinion
e) Quality of information	

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

No additional information

6. Population

6.1 Year or period	2019-2024

6.2 Population size (in reporting unit)

a) Unit	number of map 1x1 km grid cells
b) Minimum	
c) Maximum	

d) Best single value	9
6.3 Type of estimate	Best estimate
6.4 Quality of extrapolation to reporting unit	

6.5 Additional population size (using population unit other than reporting unit)

a) Unit	
b) Minimum	
c) Maximum	
d) Best single value	
e) Type of estimate	
6.6 Population size; Method used	Complete survey or a statistically robust estimate
6.7 Short-term trend; Period	2013-2024
6.8 Short-term trend; Direction	Decreasing
6.9 Short-term trend; Magnitude	
a) Estimated minimum	18
b) Estimated maximum	18
c) Pre-defined range	
d) Unknown	No
e) Type of estimate	Best estimate
f) Rate of decrease	Decreasing >1% (more than one percent) per year on average
6.10 Short-term trend; Method used	Complete survey or a statistically robust estimate
6.11 Long-term trend; Period	2001-2024
6.12 Long-term trend; Direction	Increasing

6.13 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Confidence interval	
d) Rate of decrease	
6.14 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data

6.15 Favourable Reference Population (FRP)

ai) Population size	
aii) Unit	
b) Pre-defined increment	Current population is between 26% and 50% smaller than the FRP
c) Unknown	No
d) Method used	Expert opinion
e) Quality of information	

6.16 Change and reason for change in population size

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

6.17 Additional information

No additional information

6.18 Age structure, mortality and reproduction deviation	No deviation 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?	Yes
c) If No or Unknown, is there a sufficiently large area of unoccupied habitat of suitable quality?	

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	Based mainly on expert opinion with very limited data
7.3 Short-term trend; Period	2007-2024
7.4 Short-term trend; Direction	Stable
7.5 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of data
7.6 Long-term trend; Period	
7.7 Long-term trend; Direction	
7.8 Long-term trend; Method used	

7.9 Additional information

No additional information

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
PA08: Extensive grazing or undergrazing by livestock	Ongoing and likely to be in the future	Medium (M)
PI03: Problematic native species	Ongoing and likely to be in the future	Medium (M)
PM07: Natural processes without direct or indirect influence from human activities or climate change	Ongoing and likely to be in the future	Medium (M)
PK03: Mixed source air pollution, air-borne pollutants	Ongoing and likely to be in the future	Medium (M)
PK04: Atmospheric N-deposition	Ongoing and likely to be in the future	Medium (M)
PJ01: Temperature changes and extremes due to climate change	Only in future	Medium (M)
PJ04: Sea-level rise due to climate change	Only in future	Medium (M)

8.2 Sources of information

See section 14 References

8.3 Additional information

No 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	Expand the current range of the species (related to 'Range')
9.3 Location of the measures taken	Only inside National Site Network
9.4 Response to measures	Medium-term results (within the next two reporting periods, 2025–2036)

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
MM01: Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High (H)
MI05: Management of problematic native species	High (H)
MI02: Management, control or eradication of established invasive alien species of Union concern	Medium (M)
MI03: Management, control or eradication of other invasive alien species	Medium (M)
MI04: Restoration of habitats affected by invasive alien species (incl. of Union concern and others)	Medium (M)
MS03: Restoration of habitat of species from the directives	High (H)
MS02: Reintroduce species from the directives	Medium (M)
MF08: Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats).	Medium (M)

9.6 Additional information

No additional information

10. Future prospects

10.1a Future trends of parameters

ai) Range	Overall stable
bi) Population	Overall stable
ci) Habitat for the species	Overall stable

10.1b Future prospects of parameters

aii) Range	Poor
bii) Population	Bad
cii) Habitat for the species	Good

10.2 Additional information

No additional information

11. Conclusions

11.1 Range	Unfavourable-inadequate (U1)
11.2 Population	Unfavourable-bad (U2)
11.3 Habitat for the species	Favourable (FV)
11.4 Future prospects	Unfavourable-bad (U2)
11.5 Overall assessment of Conservation Status	Unfavourable-bad (U2)
11.6 Overall trend in Conservation Status	Deteriorating

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

No additional information

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	
b) Minimum	
c) Maximum	
d) Best single value	
12.2 Type of estimate	
12.3 Population size inside the network; Method used	
12.4 Short-term trend of population size within the network; Direction	
12.5 Short-term trend of population size within the network; Method used	
12.6 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Direction	
12.7 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Method used	

12.8 Additional information

No additional information

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

AMPHIBIAN AND REPTILE CONSERVATION TRUST 2011. Sand lizard and natterjack toad recovery project 2009-2011. CCW Contract Science Report 963, Countryside Council for Wales, Bangor.

ARC Data. Occupancy data for herpetofauna is based on data held internally by Amphibian and Reptile Conservation, combining a variety of data sources.

BEEBEE, T & BUCKLEY, J 2001. Natterjack toad (Bufo calamita) Site Register for the UK 1970 −1999 inclusive. University of Sussex and The Herpetological Conservation Trust, UK.

BEEBEE, T & DENTON, J 1996. The natterjack toad conservation handbook. English Nature, Peterborough.

BRIG. 2007. A preliminary assessment of the implications of climate change for the implementation of UK BAP targets. Report to UK Biodiversity Partnership Standing Committee. (Draft).

CUNNINGHAM, AA & MINTING, P 2008. National survey of Batrochochytridium dendrobatridis infection in UK amphibians 2008. Final report, Institute of Zoology, London.

COFNOD – North Wales Biological Record Centre

EDGAR, P 2007. The conservation status of the natterjack toad Bufo calamita and sand lizard Lacerta agilis in Wales. CCW Contract Science Report 788. Countryside Council for Wales, Bangor.

GLEED-OWEN, C, BUCKLEY, J, CONEYBEER, J, GENT, T, MCCRACKEN, M, MOULTON, N, & WRIGHT, D 2005. Costed plans and options for herpetofauna surveillance and monitoring. CCW Contract Science Report 666. Countryside Council for Wales, Bangor.

HARPER, J & CARTWRIGHT, M 2025 Amphibian & Reptile Conservation Trust. personal communication on recent status of natterjack in Wales.

HERPETOLOGICAL CONSERVATION TRUST 2001. Sand lizard and natterjack toad recovery project 2000. CCW Contract Science Report 467. Countryside Council for Wales, Bangor.

HERPETOLOGICAL CONSERVATION TRUST 2003a Sand lizard and natterjack toad recovery project 2002. CCW Contract Science Report 573. Countryside Council for Wales, Bangor.

HERPETOLOGICAL CONSERVATION TRUST 2003b. Database and geographical information system. CCW Contract Science Report 574. Countryside Council for Wales, Bangor.

HERPETOLOGICAL CONSERVATION TRUST 2005. Sand lizard and natterjack toad recovery project 2004. CCW Contract Science Report 665. Countryside Council for Wales, Bangor.

HERPETOLOGICAL CONSERVATION TRUST 2006. Sand lizard and natterjack toad recovery project 2005. CCW Contract Science Report 727. Countryside Council for Wales, Bangor.

HERPETOLOGICAL CONSERVATION TRUST 2007. Sand lizard and natterjack toad recovery project 2005-2006. CCW Contract Science Report 774. Countryside Council for Wales, Bangor.

HERPETOLOGICAL CONSERVATION TRUST 2009. Sand lizard and natterjack toad recovery project 2007-2009. CCW Contract Science Report 872. Countryside Council for Wales, Bangor.

MOULTON, N & BUCKLEY, J 2015. Sand lizard and natterjack toad recovery project 2011-2014. NRW Evidence Report. Report No.32. 23pp. Bangor.

Main pressures

8.2 Sources of information

No sources of information

15. Explanatory Notes

Field label	Note
5.3: Short-term trend; Direction	Within the Welsh part of the UK population, the range had previously been increasing due to re-introductions to new localities and spread/population growth within localities, but is now considered to be stable.
5.11: Change and reason for change in surface area of range	In the previous reporting round, within the Welsh part of the UK population, the range had been increasing due to re-introductions to new localities and spread/population growth within localities. These have apparently remained stable since. From 1995 to 2003 they were present at Gronant and Talacre (Point of Ayr). In 2003 an intervening site was established at Presthaven. All three localities occupy two 10km squares (SJ08, SJ18). At the 1km level, the range had increased from an original four 1km squares (Gronant and Talacre) to six 1km squares (Gronant, Talacre and Presthaven) by 2013. Spawn was translocated to Bettisfield on the Dee Estuary coast (a third 10km square (SJ27) and a 7th 1km square in 2015, 2016 and 2017. Records increased to eleven 1 km squares by 2018 but have now reduced to nine 1 km squares as of 2024. However, the 10km scale range remains the same. The map is based on the datasets held by Amphibian and Reptile Conservation Trust who were UKBAP lead partner for this species and who implement the re-introduction programme in Wales. Relevant data for all the report fields can be found in the following references listed at 4.2: Herpetological Conservation Trust 2003a, 2005, 2006, 2007 and 2009, Amphibian and Reptile Conservation 2011, Moulton and Buckley 2015. ARC Data. Occupancy data for herpetofauna is based on data held internally by Amphibian and Reptile Conservation, combining a variety of data sources and LERC records.

6.8: Short-term trend; Direction	The populations in Wales are all re-introduced and another site was included since 2013 so it is considered that the population in Wales is increasing. Animals are spreading out on each site to occupy any ponds created/managed for them and there are consequent increases in the number of spawn strings and emergent toadlets. Populations do fluctuate with variations in the extent and longevity of suitable water levels in breeding ponds, but spawn/tadpoles are rescued and transferred if water levels decline too soon (See HCT reports cited in 4.2). Some of the ponds have also undergone more advanced vegetational succession, which would exclude Natterjack from breeding, and possibly contributing to this localised decline.
6.9: Short-term trend; Magnitude	The number of 1km squares in Wales increased from 6 in 2013 to 11 in 2018 all derived from re-introductions to suitable dune habitat (Bettisfield) or subsequent spread at old sites. This is a 83% increase over the period of 2013-2018. This reduced to 9 1km squares for 2019-2024 (18% decrease), originating from updated records, not necessarily from the same sites from the previous reporting period, though possibly also for reintroduced populations at two sites not persisting. This could also be an artefact of the data acquisition, where monitored sites have not been followed-up or toads have been undetected through error. Data on re-introductions and spread within localities is available in the HCT refs cited in 4.2 and HCT 2003b and in the ARC Data.
6.11: Long-term trend; Period	Natterjack toads were first re-introduced in 1995. The population increased to 11 1km squares from 2013-18, but reduced to 9 km squares 2019-2024. This could however be an artefact of the data acquisition, where monitored sites have not been followed up or toads have been undetected through error.
6.12: Long-term trend; Direction	This species was extinct in Wales until 1995 when it was first reintroduced to Wales as part of the Species Recovery Project and the UKBAP action plan. The population count is based on the NBN datasets provided by Amphibian and Reptile Conservation Trust who are UKBAP lead partner for

	this species and who implement the reintroduction programme in Wales, and updated with data from local record centres (COFNOD, Aderyn). Relevant data for all of the report fields can be found in the references listed at 4.2: All natterjack toads in Wales are located solely in sand dune habitat.
6.16: Change and reason for change in population size	The reintroduced Welsh population (as measured by 1km squares) has increased from none in 1989 up to 11 in 2018, but has fluctuated to 9 during 2019-24. The general increases have coincided with increased amount of aquatic habitat available for reproduction on each site (for data from surveillance see the HCT reports listed in 4.2).
7.1: Sufficiency of area and quality of occupied habitat	Occupied habitat area Natterjack toads in Wales occur only in sand dune habitat. They occupy a fairly narrow area of sand dune, restricted on the landward side by roads and development. There is thought to be a sufficient amount of habitat in Wales to support a viable population of the species. Occupied habitat quality The overall site management at the re-introduced localities is suitable for natterjack toads. Ponds are managed to mitigate common toad competition, scrub is controlled to prevent attracting common toads and to provide the open short turf swards for natterjack foraging. However, as at all Welsh dune systems, there is an issue of dune stabilisation due to reduced sand availability and possible enrichment from aerial nitrogen. These sites have generally not been grazed by stock, though grazing with ponies has been introduced at certain areas such as at Gronant and future management may include interventions to increase dune mobility for a range of dune taxa. The dune systems themselves are also restricted physically by landward infrastructure (roads/rail, golf course and caravan sites/ houses) . See Beebee & Denton, 1996.

7.2: Sufficiency of area and quality of occupied habitat; Methods used	The annual monitoring of re-introduction sites (see HCT references in section 4.2) delivers information on the numbers of breeding ponds, calling males, the number of spawn strings produced and the aquatic and terrestrial management work that has taken place at each site. Aquatic habitat for the species has increased in quantity and quality at the re-introduction sites due to active management. Terrestrial habitat whilst being actively managed to control scrub, is also impacted by the general problem of stabilisation. There are, however, no empirical assessments of terrestrial habitat quality and this is judged by the HCT/ARC project manager at each site using expert knowledge.
7.4: Short-term trend; Direction	Stable: The amount of habitat available has not changed (Edgar, 2007 and see refs cited in 4.2). The sand dune habitat occupied by natterjack toads is being managed so quality of habitat should be improving and there is no need to provide extra habitat.
7.5: Short-term trend; Method used	The extrapolation is used here because it is not empirically known exactly how much of the available terrestrial habitat the toads on each reintroduced site are using, whilst it is easy to record their use of breeding ponds (see HCT refs in 4.2.).
8.1: Characterisation of pressures	Pressures: These pressures all relate to Welsh natterjack sites and can mostly be referenced to evidence in Beebee and Denton (1996). PA08: relates to undergrazing (often the product of extensive grazing regimes) leads to dominance of marram and lack of bare sand. Rabbits are important grazers on most sites. This can lead to habitat fragmentation as dune stabilisation makes habitat unsuitable resulting in isolated populations in a fragmented habitat. PM07: relates to scrub encroachment on aquatic and terrestrial habitats; colonisation leads to siltation and drying

out of breeding ponds

PI03: this broad category includes interspecific predation/ disease. This relates to direct predation of eggs and larvae by invertebrates and fish and competition from common toad tadpoles. The latter has been a pressure at Talacre Warren where other more suitable ponds have been created to attract common toads. It also applies to animal disease which could impact on rabbits (myxomatosis, rabbit haemorrhagic disease) that maintain some short sward areas. There is also the deliberate or accidental introduction of fish to natterjack aquatic habitats. Some fish act as predators of natterjack eggs and larvae (e.g. rudd) whilst others may assist natterjack survival by removing invertebrate predators, frog and common toad tadpoles. (Beebee and Denton, 1996). Native plants, such as various trees, aquatic plants and sea buckthorn can colonise natterjack habitat and alter it physically to reduce suitability for natterjack adult and larvae to persist.

PK01: pollution to surface waters- refers to the impact of run off from adjacent land on the aquatic habitat causing enrichment and more rapid succession of vegetation in the ponds and also the impact of nitrogen on dune stabilisation, soil development and scrub growth. J01 is considered a low pressures and consequently not formally reported in line with JNCC guidance.

PJ04: refers to the potential for sea level rise, due to the majority of Natterjack sites in Wales being on the coast.

PJ01: increased temperatures could increase pond drying before tadpoles complete metamorphosis.

PF15: modifications of coastal habitats through development of infrastructure and urban areas can remove and fragment important terrestrial habitat.

PK03 – mixed air-source pollution predominately refers to

nitrogen pollution mentioned below, with other pollutants such as acid deposition historically an issue though less so now. Other pollutants are unknown.

PK04: Aerial nitrogen deposition likely threatens sand dune and other open habitats through causing rapid growth of colonising plants that would shade out and further enrich the habitat.

Threats: These threats all relate to Welsh natterjack sites

PA08: undergrazing - the Welsh reintroduction sites currently have limited grazing, relying on rabbits to maintain short, open swards. None of the sites are part of agricultural systems, being adjacent to caravan parks, etc, but it is hoped that grazing could be restored further (there are presently ponies grazing at the Gronant dunes). However, bovine TB and the ability of graziers to provide livestock make this a continuing threat.

PM07: relates to the continuing threat of scrub encroachment on aquatic and terrestrial habitats which leads to siltation and drying out.

PI03: this threat includes interspecific competition/ predation. This relates to direct predation of eggs and larvae by invertebrates and fish and competition from common toad tadpoles. The latter has been a pressure at Talacre Warren where other more suitable ponds have been created to attract common toads. It also applies to animal disease which could impact on rabbits (myxomatosis, rabbit haemorrhagic disease) that maintain some short sward areas.

The continuing threat of deliberate or accidental introduction of fish to natterjack aquatic habitats. Some fish act as predators of natterjack eggs and larvae (e.g. rudd) whilst others may assist natterjack survival by removing invertebrate predators, frog and common toad tadpoles.

(Beebee and Denton, 1996).

PJ04: there are threats from climate change impacts on coastal vertebrates which include sea level rise, increased storm surges leading to beach erosion or other weather changes that may impact the availability of suitable breeding pools or terrestrial habitat due to sand loss or re-profiling (See Brig, 2007 for discussion of risk to habitat of natterjack toad- the species itself was not selected for this study).

PJ01: this refers to the threat of climate change impacts on temperature and water levels which could reduce the amount of and duration of water levels in breeding ponds via water table or rainfall impacts.

PK01: pollution to surface waters- refers to the impact of run off from adjacent land on the aquatic habitat causing enrichment and more rapid succession of vegetation in the ponds and also the impact of nitrogen on dune stabilisation, soil development and scrub growth.

PF15: sea defences- there are continuing demands on the coastline of north Wales for the development of further port facilities and protection along the coast of the Dee Estuary, where new re-introductions are proposed. Changes to coastal process threaten natterjack toad habitat.

PK01 & PF15 were considered low threats and consequently not formally reported in line with JNCC guidance.

PK03 and PK04: The threat of aerial pollutants, especially nitrogen are likely to continue through creating rapid plant growth in sand dunes and other habitat suitable for this species. Without controlling the deposition, control of rapid vegetational succession is needed through grazing and mechanical means.

9.5: List of main conservation measures	Further reintroductions to new sites are possible, with existing sites requiring management to maintain suitability i.e. stopping ponds from becoming overgrown and scrubbing up of sand dunes. General conservation of sand dune habitat, which is itself under threat from numerous sources is required. In relation to the conservation measures above: MM01 – control of vegetational succession of sand dunes and scrapes, keeping patches of sand exposed. MI05 – control of native species likely to colonise sand dune habitat, such as sea buckthorn, birch trees, with breeding ponds being colonised by aquatic plants such as common reed and bulrush. MI02 – EU listed invasive species of sand dunes include pampas grass, giant hogweed, and Himalayan Balsam, with natterjack ponds susceptible to invasion by curly waterweed and Nutall's waterweed. These species are not as prominent in sand dunes at present but still represent a threat on the horizon. MI03 – other invasive species of concern but not listed on the EU list include the plants Japanese rose, Russian vine, red hot poker, with one vertebrate, the domestic cat. For domestic cats, there have been cases where planners have been advised against housing developments adjacent to sand dunes to prevent incursions from domestic cats. MI04 – restoration of habitats after removal of invasive species can include removal of enriched soils amidst sand dune habitats. MS03 – restoration of habitats from the directives – sand dunes are listed under the directive, and measures to restore can be of benefit to natterjack toads.

	MS02 – reintroductions have taken place across Wales, but colonisation of other sand dune or even heathland habitats could continue providing they are in suitable condition. MF08 – changes in coastal systems can include notching embanked sand dunes and even removal of sea defences where appropriate to facilitate development of sand dunes with natural processes such as movement of sands.
10.1: Future trends and prospects of parameters	The production of a strategy for future plans for re-introduction sites along the Dee Estuary may result in new locations being identified as being suitable for natterjack toad re-introductions, thus extending the range in Wales, however this is not yet certain so overall stable has been reported.
11.1: Range	Conclusion on Range reached because: (i) the short-term trend direction in Range surface area is stable; and (ii) the current Range surface area is not more than 10% below the Favourable Reference Range.
11.2: Population	Conclusion on Population reached because:(i) the short-term trend direction in Population size is decreasing by more than 1% per year; (ii) the current Population size is more than 25% below the Favourable Reference Population and iii) reproduction, mortality and age structure not deviating from normal.
11.3: Habitat for the species	Conclusion on Habitat for the species reached because: i) the area of occupied habitat is sufficiently large for the long-term survival of the species (ii) the quality of occupied habitat is suitable for the long-term survival of the species; and (iii) the short-term trend in area of habitat is stable.
11.4: Future prospects	Conclusion on Future prospects reached because: (i) the Future prospects for Range are poor; (ii) the Future prospects for Population are bad; and (iii) the Future prospects for Habitat for the species are good.
11.5: Overall assessment of Conservation Status	Overall assessment of Conservation Status is Unfavourable-bad because two of the conclusions are Unfavourable-bad.

6.15: Favourable Reference Population (FRP)	The UK-level FRV for population was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. Following expert review, a Wales-level FRV was derived based on population trend and abundance data specific to Wales, rather than adopting the UK-level value. The revised FRV has been set as expert opinion suggests that the FRV is over 800 individuals and with an actual population which is now smaller than 400 adults this makes the pre-defined range of between 26% and 50% smaller than the FRP appropriate for Wales.
5.10: Favourable Reference Range (FRR)	The UK-level FRV for range was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. Following expert review, a Wales-level FRV was derived based on distribution and trend evidence specific to Wales, rather than adopting the UK-level value. The revised FRV has been set as the previous range in Wales likely to have been larger than current range