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:

S1213 - Common frog (*Rana temporaria*)

SCOTLAND

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 (Scotland information only)**
1.2 Species code	**1213**
1.3 Species scientific name	**Rana temporaria**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Common frog

2. Maps

2.1 Sensitive species	No
2.2 Year or period	1982-2018
2.3 Distribution map	Yes
2.4 Distribution map Method used	Based mainly on extrapolation from a limited amount of data
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

Price, S. J., Leung, W. T., Owen, C., Sergeant, C., Cunningham, A. A., Balloux, F., ... & Nichols, R. A. (2018). Temperature is a key driver of a wildlife epidemic and future warming will increase impacts. bioRxiv, 272369.
ARC, 2018. Distribution data supplied to SNH in respect of Article 17 reporting for amphibians; Sources: ARC, Record Pool, NBN Trust, Froglife and others. Dates: 1982-2018; copyright status as stated in relevant column; (Excel spreadsheet, December 2018.)
McInerny, C.J. and Minting, P.J (2016). The Amphibians and Reptiles of Scotland. The Glasgow Natural History Society, Glasgow, Scotland.
Wilkinson, J.W., Arnell, A.P. (2013) NARRS Report 2007-2012: Establishing the Baseline (HWM Edition). ARC Research Report 13/01.
Baker, J., Beebee, T., Buckley, J., Gent, T. & Orchard, D. (2011) Amphibian habitat management handbook. Amphibian and Reptile Conservation, Bournemouth.
Open Space (in prep (a)). SNH Commissioned Report Survey of Habitat Suitability for Amphibians at Four Locations along the Solway Coast (SNH use only)
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Freshwater Habitats Trust (2015) Results of the Big Spawn Count 2014 [Online] Available from:https://freshwaterhabitats.org.uk/wp-content/uploads/2015/02/Results-of-the-Big-Spawn-Count-2014.pdf. [Accessed:13 November 2018].
Barrett, J. (2018) Garden Survey reveals sightings of frog and toad are drying up.[Online] Available from: https://www.rspb.org.uk/about-the-rspb/about-us/media-centre/press-releases/garden-survey-reveals-sightings-of-frog-and-

toad-are-drying-up-in-scotland/. Accessed 13 November 2018.
Berger, G. Graef, F. Bethwell, C.,Bruhl, C.A. Alscher, A., Schmidt, T. & Weber B. (2015) Chapter 4: Assessment of pesticide exposure of amphibians and reptiles in agricultural landscapes in Germany and evaluation of the present pesticide risk assessment practice in EU. In Bruhl, A.C., Alscher, A., Hahn, M., Berger. G., Bethwell, C., Graef, F., Schmidt, T and Weber B. (2013). Texte 76/2015 Environmental Research of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety Project No. (FKZ) 3709 65 421 Report No. (UBA-FB) 002175/E Protection of Biodiversity in the Risk Assessment and Risk Management of Pesticides (Plant Protection Products & Biocides) with a Focus on Arthropods, Soil Organisms and Amphibians. Umweltbundesamt. Available from: https://www.researchgate.net [Accessed: 5th Nov 2018]
Paterson, E. (2017). Annual variation in the numbers of breeding common frog Rana temporaria at a cluster of sites in the west of Scotland. Glasgow Naturalist 26(Part 3), 25-31.
Hitchings, S. P., & Beebee, T. J. (1997). Genetic substructuring as a result of barriers to gene flow in urban Rana temporaria (common frog) populations: implications for biodiversity conservation. Heredity, 79(2), 117.
Griffiths, R. A., Sewell, D., & McCrea, R. S. (2010). Dynamics of a declining amphibian metapopulation: survival, dispersal and the impact of climate. Biological Conservation, 143(2), 485-491.
NBN Atlas website https://scotland.nbnatlas.org, accessed 18 October 2018
North Ayrshire Countryside Ranger Service: Records provided by North Ayrshire Countryside Ranger Service, accessed through NBN Atlas website.
North East Scotland Amphibians & Reptiles 1850 - 2016: Records provided by North East Scotland Amphibians & Reptiles 1850 - 2016, accessed through NBN Atlas website.
North East Scotland Biological Records Centre: Records provided by North East Scotland Biological Records Centre, accessed through NBN Atlas website.
Outer Hebrides Biological Recording: Records provided by Outer Hebrides Biological Recording, accessed through NBN Atlas website.
Recovery of the medicinal leech Hirudo medicinalis in Scotland - Phase II: Records provided by Recovery of the medicinal leech Hirudo medicinalis in Scotland - Phase II, accessed through NBN Atlas website.
Reptiles and Amphibians Dataset: Records provided by Reptiles and Amphibians Dataset, accessed through NBN Atlas website.
River macroinvertebrate data for 2005 and 2006: Scottish Environment Protection Agency 2015, licensed under the Open Government Licence v3.0
Ron McBeath records (2010 - 2014): Records provided by Ron McBeath records (2010 - 2014), accessed through NBN Atlas website.
Scottish Environment Protection Agency: Records provided by Scottish Environment Protection Agency, accessed through NBN Atlas website.
Scottish Natural Heritage: Records provided by Scottish Natural Heritage, accessed through NBN Atlas website.
Scottish Wildlife Trust: Records provided by Scottish Wildlife Trust, accessed through NBN Atlas website.
South West Scotland Environmental Information Centre (formerly DGERC): Records provided by South West Scotland Environmental Information Centre (formerly DGERC), accessed through NBN Atlas website.
Species within North Ayrshire from 1984 - Present: Records provided by Species within North Ayrshire from 1984 - Present, accessed through NBN Atlas website.
Survey and monitoring records for Scottish Wildlife Trust reserves from reserve convenors and Trust volunteers - Verified data: Records provided by Survey and

monitoring records for Scottish Wildlife Trust reserves from reserve convenors and Trust volunteers - Verified data, accessed through NBN Atlas website.
The ARC Rare Species Database: Amphibian and Reptile Conservation Trust, 2016.
The Wildlife Information Centre: Records provided by The Wildlife Information Centre, accessed through NBN Atlas website.
The Wildlife Information Centre - BioBlitz Events: The Wildlife Information Centre or BRISC (depends on orginator in dataset name)
The Wildlife Information Centre - LBS Network Strategic Survey: The Wildlife Information Centre or BRISC (depends on orginator in dataset name)
TWIC - Identification Workshops dataset: Records provided by TWIC - Identification Workshops dataset, accessed through NBN Atlas website.
TWIC Biodiversity Field Trip Data (1995-present): Records provided by TWIC Biodiversity Field Trip Data (1995-present), accessed through NBN Atlas website.
Vertebrates (except birds, INNS and restricted records), Outer Hebrides: Records provided by Vertebrates (except birds, INNS and restricted records), Outer Hebrides, accessed through NBN Atlas website.

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	Use of different method The change is mainly due to:	Use of different method
5.12 Additional information		

6. Population

6.1 Year or period	1982-2018	
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	3148
6.3 Type of estimate	Minimum	

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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	711
6.5 Type of estimate	Minimum	
6.6 Population size Method used	Based mainly on expert opinion with very limited data	
6.7 Short-term trend Period	2007-2018	
6.8 Short-term trend Direction	Uncertain (u)	
6.9 Short-term trend Magnitude	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 Short-term trend Method used	Based mainly on expert opinion with very limited data	
6.11 Long-term trend Period		
6.12 Long-term trend Direction		
6.13 Long-term trend Magnitude	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 Long-term trend Method used		
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	No change	
	The change is mainly due to:	
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)?	Unknown
	b) Is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)?	Unknown
7.2 Sufficiency of area and quality of occupied habitat Method used	Insufficient or no data available	
7.3 Short-term trend Period	2007-2018	
7.4 Short-term trend Direction	Unknown (x)	
7.5 Short-term trend Method used	Insufficient or no data available	
7.6 Long-term trend Period		
7.7 Long-term trend Direction		
7.8 Long-term trend Method used		

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7.9 Additional information

8. Main pressures and threats

8.1 Characterisation of pressures/threats

Pressure	Ranking
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	H
Use of plant protection chemicals in agriculture (A21)	M
Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (L02)	H
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	M
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	M
Conversion from other land uses to commercial / industrial areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F03)	M
Interspecific relations (competition, predation, parasitism, pathogens) (L06)	M
Problematic native species (I04)	M
Other invasive alien species (other then species of Union concern) (I02)	M
Mixed source pollution to surface and ground waters (limnic and terrestrial) (J01)	M

Threat	Ranking
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	H
Use of plant protection chemicals in agriculture (A21)	M
Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (L02)	H
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	M
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	M
Conversion from other land uses to commercial / industrial areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F03)	M
Interspecific relations (competition, predation, parasitism, pathogens) (L06)	H
Problematic native species (I04)	M

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Other invasive alien species (other then species of Union concern) (I02)	M
Mixed source pollution to surface and ground waters (limnic and terrestrial) (J01)	M

8.2 Sources of information

8.3 Additional information

9. Conservation measures

9.1 Status of measures

a) Are measures needed? No

b) Indicate the status of measures

9.2 Main purpose of the measures taken

9.3 Location of the measures taken

9.4 Response to the measures

9.5 List of main conservation measures

9.6 Additional information

10. Future prospects

10.1 Future prospects of parameters

a) Range

b) Population

c) Habitat of the species

10.2 Additional information

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:

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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 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 Additional information	

13. Complementary information

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

Distribution Map

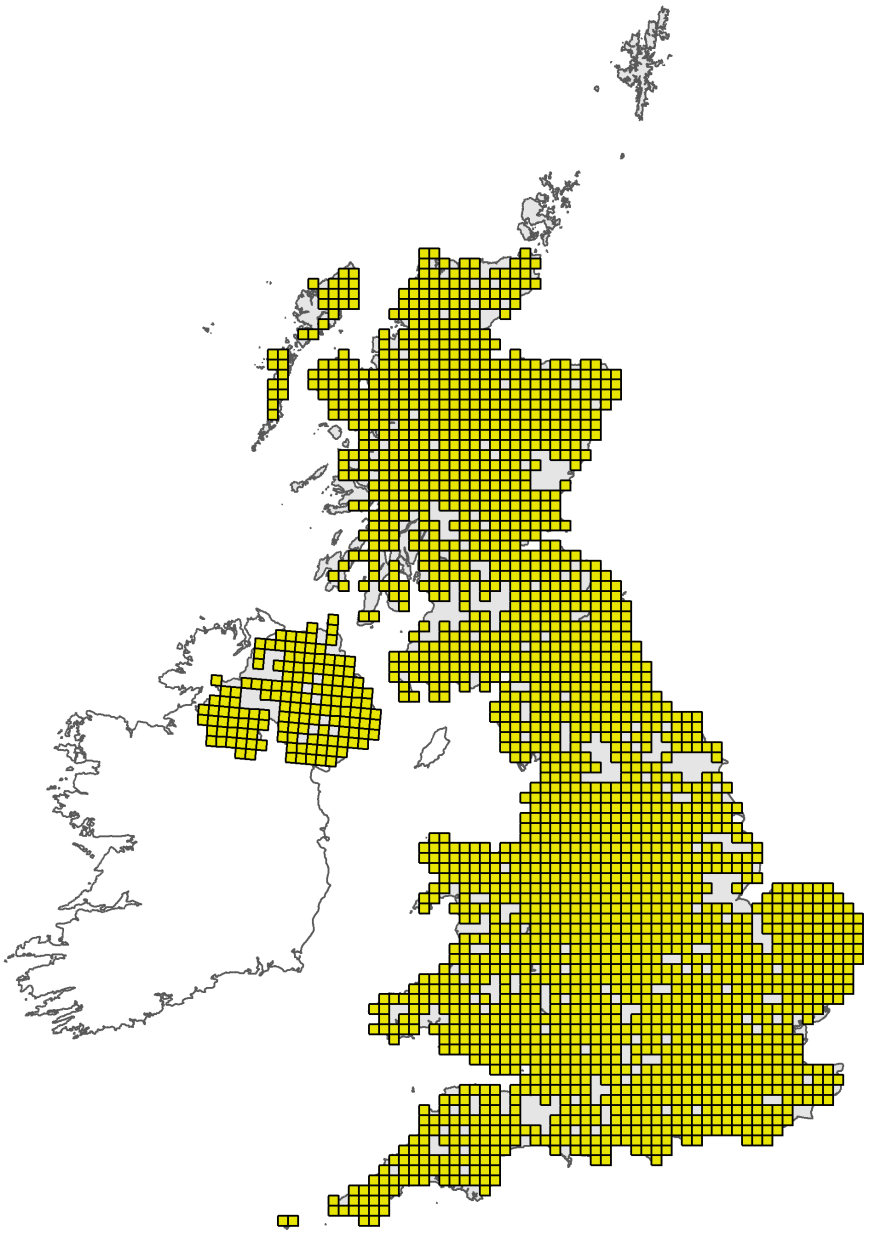

Figure 1: UK distribution map for S1213 - Common frog (*Rana temporaria*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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 S1213 - Common frog (*Rana temporaria*). 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 35km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Species name: Rana temporaria (1213) Region code: ATL

Field label	Note
5.5 Short term trend; Method used	No range value (in km2) was provided in the previous reporting round (2007-2012), however, a maximum figure of 1132 10km2 is provided for population. When comparing this to the 10km2 for the time period 1982-2018, these data shows a decline with only 721 10km2 , and if comparing for the reporting timeframe, just 424 10km2. This is not thought to be a genuine decline for Rana temporaria in Scotland, but is the result of differences in data collection methods, incomplete and inconsistent monitoring across the species range and the Article 17 reporting period. There doesn't appear to be evidence of a short-term change in range.
6.2 Population size	There is mixed evidence on the trend in population size, though no clear signal of an increase or decline. Evidence from mass participation surveys such as that carried out by FHT (FHT, 2015), BTO and RSPB show common frog to be widespread. There is some indication from a widescale garden survey of a recent decline (Barrett 2018), but further analysis is required on this dataset to esablish whether it represents a real decline. Results from a structured survey (NARRS) did not reveal an indication of any major change in status (Wilkinson et al 2013).
6.2 Population size	The EU mandatory unit is 1x1 grid squares for population, which is a change from the 2013 reporting round where the number of 10km2 was used, making comparisons between years difficult. The number of occupied 1km2 provided (3149km2) was derived from data from NBN, ARC, and SNH. The time period used for this population figure is 1982- 2018, due to the incomplete dataset for the species over the reporting period (2013-2018). The common frog remains data deficient in Scotland, with survey effort not being consistent across the reporting period or across the species range. There are concerns over the use of data from this extended time period particularly due to the fact that it does not represent the status of the common frog over the reporting period. This hampers assessments of current status and trends.
6.3 Type of estimate	The 'best estimate' category was chosen for this metric due to the extended timeframe used (1982-2018) and as a result we do not have high confidence in the result. This time period was chosen because the common frog continues to be a data-deficient species. In addition to this, a range of data sources were collated for this work, collected using different methods; recording has also been inconsistent across the reporting period (2013-2018) making it difficult to provide a more meaningful figure for this measure. The metric for this measure has also changed since the last reporting period, from the number of 10km2 to 1km2.
8.1 Characterisation of pressures/ threats	Lower priority and so not listed. N03: Increases or changes in precipitation due to climate change. Although little is understood about how climate change induced precipitation could impact on common frogs, there is evidence for negative impacts on Triturus cristatus (Griffiths et al 2010) and it is feasible that similar effects could occur in common frog.
8.1 Characterisation of pressures/ threats	J01: Mixed source pollution to surface and ground waters. Pollution of breeding sites can be detrimental to common frog.
8.1 Characterisation of pressures/ threats	I02: Other invasive alien species (other than species of Union concern). As with other British amphibians, common frog populations can be negatively impacted by introductions of some non-native species, notably fish, American mink and aquatic macrophytes.

8.1 Characterisation of pressures/ threats	E01, F01, F03 (also includes F31 lower priority and so not listed.). These threats relate to the loss or fragmentation of habitat, or degradation in quality of habitat, resulting from a change in land use. Whilst there is little evidence specifically assessing the impact of such activities on common frog in Scotland, it is evident from other, more general studies that common frogs can be negatively affected (e.g. Hitchings & Beebee 1997). As common frogs require both aquatic and terrestrial habitats to persist, and reasonable water quality, the effects of development can be substantial. McInerny and Minting (2016) note that habitat loss has affected the status of this species. In a study of common frogs in West Scotland (Paterson 2017) there is an indication that residential development has affected the species.
8.1 Characterisation of pressures/ threats	I04: Problematic native plants & animals. The introduction of fish into frog ponds has several negative impacts on frogs. Although not as vulnerable to fish predation as the larvae of great crested newts, frog tadpoles are readily preyed upon by fish (Baker et al, 2011).
8.1 Characterisation of pressures/ threats	L06: Interspecific faunal and floral relations (competition, predation, parasitism, pathogens) Common frog populations are known to be impacted negatively by disease in parts of the UK, especially ranavirosis (Teacher et al 2010; Price et al 2017). Although significant impacts from ranavirosis have not yet been observed in Scotland, there is a reasonable prospect of pathogen introduction and spread. In addition, recent evidence indicates that climate change is likely to increase the severity of these disease impacts (Price et al 2018). Whilst there is some guidance for reducing the immediate risks associated with amphibian pathogens (e.g. guidance for amphibian fieldworkers, produced by ARG UK in 2017), there is no comprehensive plan in place to manage the risks of introduction and spread more generally.
8.1 Characterisation of pressures/ threats	L02: Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) A key threat (and pressure) is the reduction in the suitability of ponds for common frogs as a result of natural succession, where ponds typically become over-shaded by trees and scrub and/or become infilled with sediment. This often results in ponds drying out too quickly for the young of that year to develop and successfully metamorphose and leave the pond. Natural succession leads to not only a loss of suitable ponds for breeding etc. in the landscape but leads to an actual loss of ponds due to pond senescence, if left unmanaged which is often the case. Changes in agricultural practices are an important reason for this situation arising, as typically ponds are no longer required to water livestock, leading to neglect and the loss of suitable ponds in the landscape. Natural succession of ponds is an issue both in the wider countryside and on protected sites. Habitat suitability surveys were undertaken at Burrow Head SSSI and Royal Ordnance Powfoot SSSI in 2013 (Open Space, in prep (a)) for the amphibian assemblage interest feature which includes the common frog. For Burrow Head SSSI the habitat features on site were considered to be in unfavourable declining condition for the species, due to the need for scrub control and clearance of vegetation clearance from ponds inter alia; at Royal Ordnance Powfoot SSSI the habitat features are in unfavourable condition- no change. The management recommendations (Open Space, in prep (a)) are for pond management work to occur (vegetation clearance) and for scrub control around some ponds. At both sites the results from condition monitoring for the amphibian assemblage (Open Space, in prep (b)) denotes a low population of frogs, although the populations are thought to be stable.

8.1 Characterisation of pressures/ threats	A21: Use of plant protection chemicals in agriculture Pollution from agricultural sources (e.g. pesticides, fungicides etc.) will be impacting on the aquatic (Baker et al, 2011) and terrestrial environments of common frogs. From work undertaken in Germany, assessing pesticide exposure of amphibians and reptiles in agricultural landscapes (Berger et al, 2015) found that amphibians are at risk in coming into contact with plant protection chemicals both in the area being treated as well as in neighbouring (uncropped) land. The other key conclusions from this work included that amphibians were in danger of exposure to plant protection chemicals from contact with treated soil and vegetation. The work highlights that ponds and other wet areas are the preferred location for amphibians in cropped fields and they are therefore at high risk of being exposed to the chemicals in these locations. The findings also showed that amphibians are at risk from plant protection compounds through spray drift and runoff.
8.1 Characterisation of pressures/ threats	A05: Removal of small landscape features for agricultural land parcel consolidation, includes the loss of field boundaries such as hedges and stone walls etc., removal of scrub and the draining or infilling of ponds etc. The demise of these features from the landscape results in the direct loss of habitat for the common frog, but can also lead to a loss of connectivity (habitat fragmentation) and impacts the species (Baker et al, 2011, McInerny et al (2016)).
8.1 Characterisation of pressures/ threats	Lower priority and so not listed. A02: Conversion from one type of agricultural land use to another. This pressure (and threat) encompasses not only loss of important habitats, such as grassland but also includes intensification of agricultural practices, leading to the loss of important habitats for the common frog, and the reduction in connectivity between habitats, where the result is a much more fragmented and hostile environment. Intensification of agricultural not only leads to the loss of habitats, but can lead to contamination of both terrestrial and aquatic habitats through the use of fertilisers etc.
10.1 Future prospects of parameters	Given the range of evidence on pressures, threats and conservation measures, and the lack of firm evidence for any recent change in status (Wilkinson et al 2013; FHT 2015; McInerny & Minting 2016), the future prospects for Range, Population and Habitat are assessed as Stable. There is no indication of specific threats that are highly likely to substantially reduce prospects, nor measures that are highly likely to increase prospects, for any of these parameters.