

**Natural England Notification Strategy:
SSSI Notification Review for
Amphibians & Reptiles**

**Paul Edgar, Senior Environmental Specialist
(Amphibians & Reptiles)**



**Natural England
December 2015**

Version Number	Date	Main Edits	Author Initials
1.1	09.11.2015	Original draft version	PE
1.2	17.11.2015	Second draft version incorporating assessor comments plus minor rewrites and corrections to text	PE
1.3	15.12.2015	Third version incorporating SSSI Review Assurance Panel comments and ARC additions to Table 20	PE

Cover Photo: Woolmer Forest SSSI, Hampshire – one of the most important protected sites for amphibians and reptiles in England

Contents

1. Summary	4
2. Introduction	5
3. History of Site Designations for Amphibians and Reptiles	6
4. Approach	6
4.1. Characteristics of an Appropriate SSSI Series for Amphibians and Reptiles	7
4.2. Evaluation of Features	7
4.3. Representativeness of the Current SSSI Series	7
4.4. Identification of Site Amendments Required	11
4.5. Revising the SSSI Guidelines	11
5. Results and SSSI Notification Proposals for Amphibians and Reptiles	11
5.1. Characteristics of an Appropriate SSSI Series for Amphibians and Reptiles	12
5.2. Evaluation of Features	13
5.3. Representativeness of the Current SSSI Series	14
5.3.1. Range Restricted Species	14
5.3.1.i. Natterjack Toad	14
5.3.1.ii. Sand Lizard	15
5.3.1.iii. Smooth Snake	17
5.3.1.iv. Pool Frog	18
5.3.2. Widespread Species	18
5.3.2.i. Great Crested Newt	18
5.3.2.ii. Amphibian Assemblage	21
5.3.2.iii. Reptile Assemblage	22
5.3.2.iv. Common Toad	23
5.3.2.v. Adder	23
5.4. Identification of Site Amendments Required	23
5.4.1. Improving the Existing Site Series for Range Restricted Species	24
5.4.1.i. Natterjack Toad	24
5.4.1.ii. Sand Lizard	24
5.4.1.iii. Smooth Snake	25
5.4.2. Expanding the Site Series for Range Restricted Species	27
5.4.2.i. Natterjack Toad	27
5.4.2.ii. Sand Lizard	29
5.4.2.iii. Smooth Snake	30
5.4.3. Widespread Species	32
5.5. Revising the SSSI Guidelines	33
6. Next Steps and Future Issues	34
7. Consequences and Risks	34
8. Implementation	35
9. References	35
Appendix I: List of Data Sources	37
Appendix II: All SSSIs with Notified Amphibian and Reptile Features	38

1. Summary

This document represents Natural England's evaluation of the adequacy of the current SSSI site series (and associated guidance) for the conservation of amphibians and reptiles. This review relied heavily on the invaluable assistance of the staff of Amphibian & Reptile Conservation (ARC), who have been working with Natural England to improve the site series through a number of MoAs.

The native amphibian and reptile species can be clearly grouped into two categories - "range restricted" and "widespread". This distinction influenced both the original SSSI guidelines and the subsequent history of site designations and it also means that this evaluation actually consists of two separate reviews. For both groups the following areas were evaluated:

- Characteristics of an appropriate SSSI network for amphibians and reptiles
- Currently notified amphibian and reptile features in England
- The representativeness of the current site series for each feature
- Identification of amendments to the site series, including improvements to and expansion of the site series (where suitable information exists) or recommendations to guide future notification (where information is lacking), including obtaining the necessary evidence
- The current SSSI guidelines for amphibians and reptiles, especially selection criteria, notifiable features and boundary setting guidance

Relevant information is presented in table form wherever possible. This includes a summary of the current site series for amphibians and reptiles (Appendix II), which consists of 104 SSSIs and 158 notified features.

The review of the range restricted species concludes that the site series for the natterjack toad, sand lizard and smooth snake features is largely adequate, albeit with some important gaps. A series of detailed improvements and amendments is proposed (where current data allow) to improve and expand the site series for these species. Some of the potential improvements to the site series for range restricted species, such as adding features to existing SSSIs following a successful re-introduction, are fairly straightforward. Other, such as expanding SSSIs for natterjack toads into farmland or linking SSSIs for sand lizards and smooth snakes via forestry and mineral sites (to improve ecological resilience), will require further planning and more detailed evidence.

The second review, which covers the widespread great crested newt plus the amphibian and reptile assemblage features, highlights the complete inadequacy of the existing site series for these features as well as a serious lack of the type of information that would be required for designing one. There is significant potential for adding these features to existing SSSIs, and also notifying new sites for them, although the resources and time required for this exercise would be significant.

Prior to any improvements to the site series for herpetofauna, however, the SSSI guidelines will require a major revision in conjunction with the other country agencies and JNCC. The creation of new species features (pool frog, common toad and adder) is proposed and changes to the selection and boundary setting criteria, plus a huge data gathering exercise, will all be needed before the notification process can resume. In tandem with these exercises, the Common Standards Monitoring guidelines for amphibians and reptiles would also have to be revised. All of this work would then help to inform the future condition monitoring of amphibian and reptile features, the revision and improvement of SSSI Favourable Condition Tables and Natural England's Detailed Notification Review process.

2. Introduction

Natural England is currently developing and implementing a strategy that will guide its activities relating to designated sites, covering local, national and internationally recognised designations. This strategy will describe Natural England's approach to how such sites are selected, what they contribute to the conservation of biodiversity, geodiversity and landscape value, and how they meet the requirements of local, national and international conservation policy. The development of the strategy began in 2008 in response to recommendations from the National Audit Office, the Public Accounts Committee and the Innovation, Universities, Science and Skills committee that a strategic approach should be taken to employing designated sites in the UK. The strategy is increasingly supported by, and forms a key delivery mechanism for, the England Biodiversity Strategy, and also forms part of the government's responses to the recommendations of the Lawton Review. The review aims to produce a clear strategy for use of designations that can be implemented from 2015.

Sites of Special Scientific Interest (SSSIs) are a UK-based designation that is designed to recognise and protect sites of the greatest national value and importance for scientific understanding of the diversity of the natural world, and for the cultural heritage these represent. SSSIs should represent the full diversity of features, contain all of our most important sites, reflect and encompass dynamic processes that support the interest on the site, and enable that interest to be resilient and adaptable to environmental change. The process whereby land is brought under a SSSI designation is called notification.

Natural England's use of SSSI notifications is being reviewed as part of the designations strategy. This review involves checking whether the right features are currently being prioritised for SSSI designations, whether the current coverage of the SSSI series adequately represents the range of interest features present in the country, and whether the boundaries of existing SSSIs are adequate to ensure their ongoing conservation. Because of the huge range of different types of features represented by SSSIs, this task is being carried out separately for each group of habitats or species and each review has been led by a relevant Natural England specialist.

This document describes the processes and results of the SSSI review for amphibians and reptiles (often collectively known as "herpetofauna"). The review covers the four species and two species assemblages that are listed in the amphibian and reptile chapter of the Guidelines for the Selection of Biological SSSIs (JNCC 1989), namely:

- Great crested newt (*Triturus cristatus*)
- Natterjack toad (*Bufo/Epidalea calamita*)
- Amphibian Assemblage
- Sand lizard (*Lacerta agilis*)
- Smooth snake (*Coronella austriaca*)
- Reptile assemblage

Three additional species (pool frog, common toad and adder) that will be proposed as new features in the planned revision to the amphibian and reptile chapter are also briefly discussed. The information presented here represents a record of the rationale for Natural England's approach to SSSI notification and, at least for some of the species features concerned at this stage, will provide guidance to inform future notifications,.

3. History of Site Designations for Amphibians and Reptiles

Well before the SSSI guidelines were written, and any sites were designated for amphibians and reptiles, it was recognised that they could be grouped into two distinct categories according to their distribution and status. The first consisted of the very range restricted herpetofauna species, the natterjack toad, sand lizard and smooth snake. The second included the much more widely distributed species, namely the great crested newt and the remaining amphibian and reptile species that were to be grouped together into two species assemblages.

This division between “range restricted” and “widespread” species was subsequently reflected in the guidelines and in the history of site designations for amphibians and reptiles (Table 1). Although the timeline shown by this table is confounded slightly by later site re-notifications, it can still be seen that the range restricted species were, quite correctly, given first priority in the notification process during the 1980s and into the 1990s. However, the next obvious step of increasing numbers of sites being notified for the widespread species features throughout the 1990s and beyond did not occur. In theory, significantly more sites throughout England should have met the selection criteria for widespread species than for the range restricted species although the latter still dominate the site series. A small number of additional sites were notified for great crested newts in the early 2000s but this represented less than a dozen new sites out of the several hundred proposed. This situation still stands and proposals are therefore made in this review for rectifying it.

Table 1: Number of Amphibian and Reptile Features Notified per Decade (total = 104 SSSIs)

Notified Feature	1980s	1990s	2000s	2010s	Totals
Range Restricted Species					
Natterjack toad	9	4	1	0	14
Sand lizard	30	15	1	0	46
Smooth snake	27	14	0	0	41
Totals	66	33	2	0	101
Widespread Species					
Great crested newt	16	8	11	1	36
Amphibian assemblage	9	4	0	2	15
Reptile assemblage	1	5	0	0	6
Totals	26	17	11	3	57
Totals for all Features	92	50	13	3	158

4. Approach

The following broad approach was used to undertake this review. This can be divided into:

- Characteristics of an appropriate SSSI network for amphibians and reptiles
- Evaluation of currently notified amphibian and reptile features in England
- Review of the representativeness of the current site series for each feature
- Identification of new sites and changes to existing sites (where suitable information exists) or recommendations to guide future notification (including obtaining the necessary evidence)
- Review of the SSSI selection and boundary setting guidance for amphibians and reptiles

4.1. Characteristics of an Appropriate SSSI Series for Amphibians and Reptiles

Amphibians and reptiles have limited mobility compared to many other taxa but it would be a mistake to assume that an appropriate site series to ensure their conservation could be limited to small or isolated sites. Some species movements can cover many kilometres, and a wide range of different habitats, within a season and all amphibians and reptiles require good links to other populations in order to maintain genetic integrity and resilient populations. Since most species function as metapopulations, scattered over the landscape as a series of smaller, inter-connected sub-populations, simply notifying the largest population in any Area of Search may not be adequate.

Great crested newts are a good example of this, in that the current SSSI guidance has favoured the notification of large single populations that have been boosted, often temporarily, by the presence of old mineral workings and brick pits. The more numerous, more natural, more resilient and more important meta-populations of great crested newts that occur in farmland and woodland in certain lowland areas have been all but excluded from the site series as a result.

The evaluation of the current site series, and any amendments suggested at this stage, have therefore been considered in the light of the ecological requirements of amphibians and reptiles and the need to ensure that resilient populations are maintained, especially in the face of future threats such as climate change (Dunford & Berry 2012; Russell 2012). In some cases, notification may not be the best way forward so improving the connectivity of SSSIs to the wider landscape and to each other, e.g. through agri-environment schemes, is also crucial.

4.2. Evaluation of Features

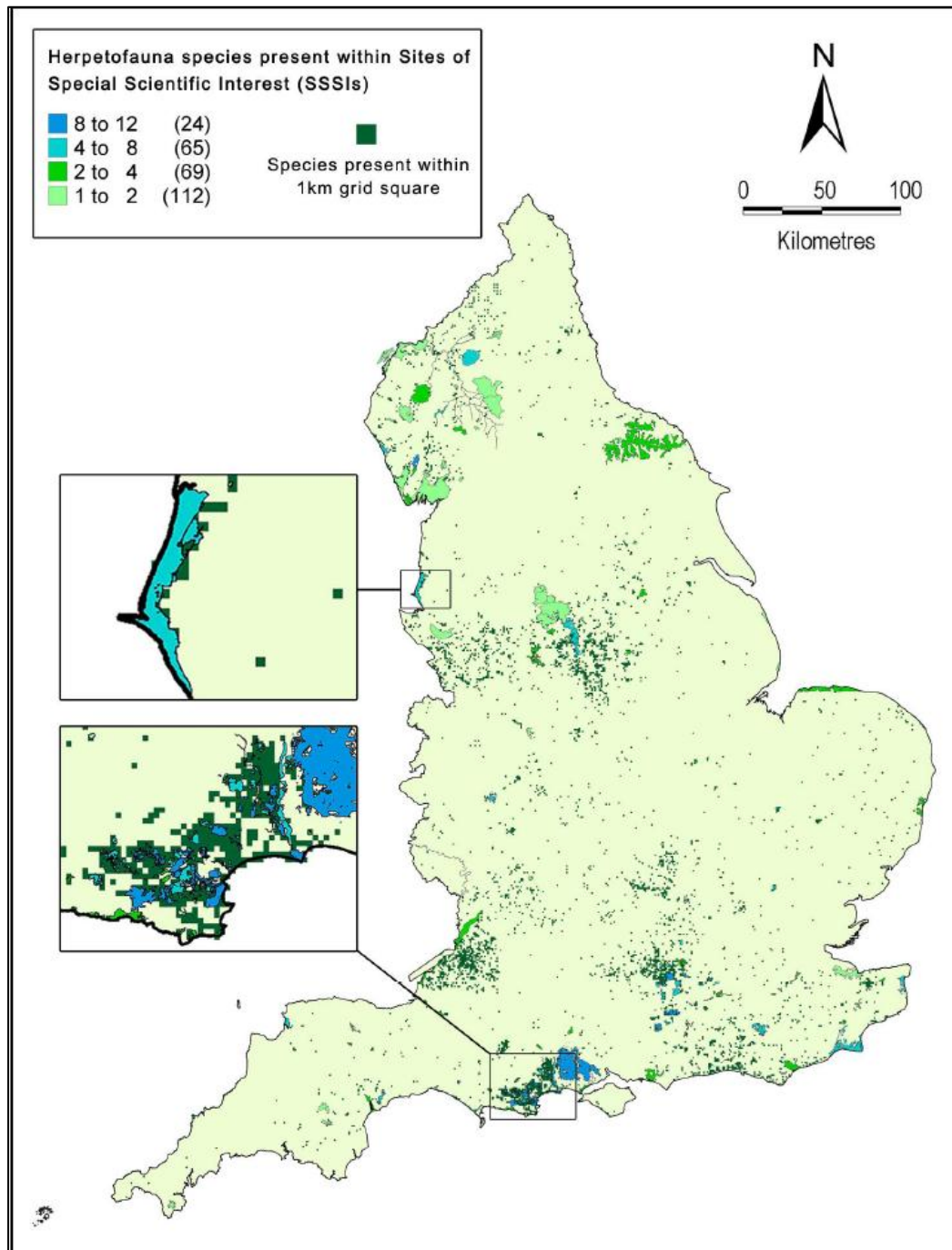
This part of the review is a simple one for amphibians and reptiles. Although they occur in many sites and habitats throughout England, potentially requiring a huge increase in the number of SSSIs for their effective conservation, the number of features involved is very small. Along with a review of the current SSSI guidelines for amphibians and reptiles, each of the current notifiable features was assessed for continued inclusion or exclusion in the site series and for any other potential changes (e.g. splitting individual species from assemblages). This draft review has been compiled by Natural England's Senior Specialist for amphibians and reptiles but relied heavily on the considerable background work, analysis of datasets and other invaluable help and advice from Amphibian & Reptile Conservation, plus discussions and workshops with NRW and SNH.

4.3. Representativeness of the Current SSSI Series

The extent to which the current SSSI series in England adequately represents the amphibian and reptile features selected using the process above (including proposed new features) was judged by using a geographical analysis of the relationship between SSSI extent, and other data indicating the known distribution of these features (where possible). These data were also used to identify where notifiable features are already present within SSSIs but are not mentioned as reasons for designation in the citation. This work was largely done by Amphibian & Reptile Conservation (Limburn, Arnell & Wilkinson 2012) and via a series of subsequent SSSI MoAs between ARC and Natural England (but see also Langton, Beckett & Dunsmore 1993; Mitchell-Jones & Gent 1997).

Although incomplete for many species, and often reflecting recorder effort more than actual distribution, records of individual amphibian and reptile species were available from a variety of sources (see Appendix I). The data were analysed against the distribution of current SSSIs (Figure 1) as well as other designations. The “Important Herpetofauna Areas” (Table 2) of the Sefton Coast (top box) and the Dorset Heaths/New Forest are clearly shown in the inset maps of Figure 1.

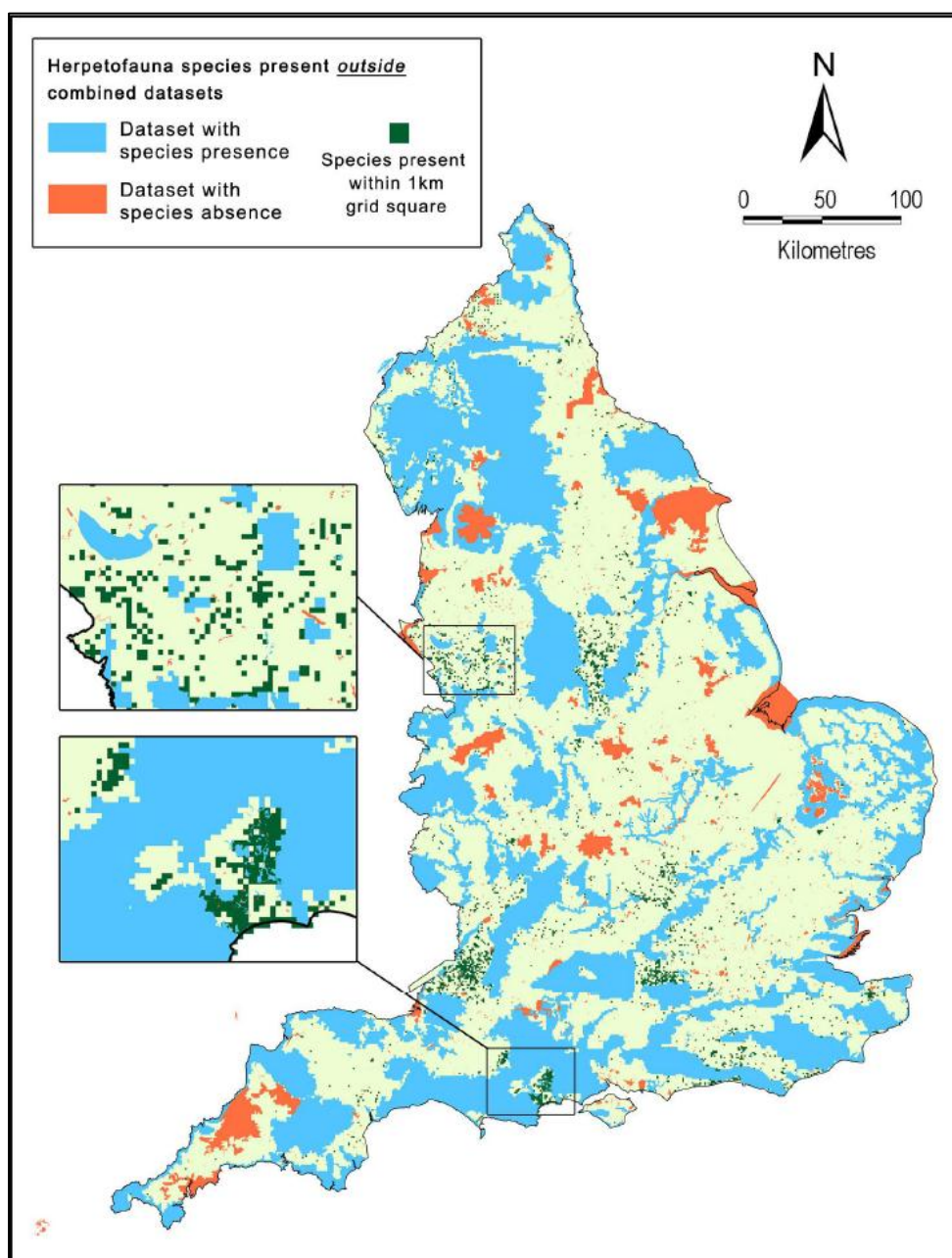
Figure 1: Herpetofauna Species Records Analysed by SSSI
 (Limburn, Arnell & Wilkinson 2012)



The data were also analysed against the distribution of combined datasets that included SSSIs, NNRs, Local Nature Reserves, HLS target areas and Nature Improvement Areas. This analysis highlighted gaps where the conservation of amphibian and reptile species was potentially not being ensured by any of the above (Figure 2). For example, the inset maps in Figure 2 show numerous records of great crested newts in their north-western hotspot centred on Cheshire (Table 3), as well as records of sand lizards and smooth snakes in forestry and mineral areas on the Dorset/Hampshire border, all well outside of any SSSIs or other conservation designations.

Figure 2: Herpetofauna Species Records Analysed by Combined Datasets

(Limburn, Arnell & Wilkinson 2012)



In addition, the representativeness of the site series was judged against the best known “Important Herpetofauna Areas” (IHAs) for several species. These IHAs, which are not yet formally embedded in amphibian and reptile conservation strategy, are essentially a means of prioritising effort and limited resources for key areas. Based on National Character Areas, as are the SSSI Areas of Search in England, the top five IHAs for the range restricted species (the smooth snake effectively only occurs in four, although re-introductions should expand this) are shown in Table 2.

Table 2: Important Herpetofauna Areas for Range Restricted Species in England

Important Herpetofauna Area	Associated National Character Area(s)	Rankings		
		Natterjack Toad	Sand Lizard	Smooth Snake
Cumbria Coast	6. Solway Basin	1	-	-
	7. West Cumbria Coastal Plain			
	19. South Cumbria Low Fells			
Sefton Coast	57. Sefton Coast	2	3	-
East Anglian Coast	76. North West Norfolk	3	-	-
	77. North Norfolk Coast			
	78. Central North Norfolk			
	79. North East Norfolk & Flegg			
	80. The Broads			
	82. Suffolk Coast & Heaths			
Wealden Heaths	120. Wealden Greensand	4	2	3
Thames Basin Heaths	129. Thames Basin Heaths	-	4	4
New Forest	131. New Forest	-	5	2
Dorset Heaths	135. Dorset Heaths	5	1	1

Among the widespread species, the great crested newt is the only one where we have any idea of IHAs. The top three hotspots for this species in England (there are several others), which actually support internationally important populations, are listed in Table 3.

Table 3: Important Herpetofauna Areas for Great Crested Newt in England

Important Herpetofauna Area	Associated National Character Area(s)	Ranking
Northwestern Claylands	32. Lancashire & Amounderness Plain	1
	56. Lancashire Coal Measures	
	59. Wirral	
	60. Mersey Valley	
	61. Shropshire, Cheshire & Staffordshire Plain	
	68. Needwood & South Derbyshire Claylands	
East Anglian Claylands	83. South Norfolk & High Suffolk Claylands	2
	84. Mid Norfolk	
	86. South Suffolk & North Essex Claylands	
	88. Bedfordshire and Cambridgeshire Claylands	
Wealden Claylands	111. Northern Thames Basin	3
	121. Low Weald	
	122. High Weald	
	123. Romney Marshes	
	124. Pevensey Levels	

4.4. Identification of Site Amendments Required

The identification of required site amendments was again divided into the range restricted species, where reasonable information is available to inform decisions, and the widespread species features, where evidence is seriously lacking. The approach taken for the former group was further divided into:

1. An evaluation of improvements that are needed to ensure the existing site series is fit for purpose for currently notified features (this was possible for sand lizard and smooth snake). This is considered essential before any consideration is given to expanding the site series
2. Proposals for potential actions to expand the site series through extending existing herpetofauna sites, adding amphibians and reptile features to other SSSIs and creating brand new sites (this was partially possible for natterjack toad, sand lizard and smooth snake although more detailed evidence and planning is still required)

With the exception of a few individual sites, it was not possible at this stage to identify detailed site amendments for the widespread species, especially any aimed at expanding the series for these features. The revision of the SSSI guidelines and a major data gathering exercise would be required before this would be possible.

4.5. Revising the SSSI Guidelines

Based on the approach outlined above, consideration was also given to the need for revising the amphibian and reptile chapter of the current SSSI guidelines. This would include a revision of the selection and boundary setting criteria, plus the actual notified features themselves. Clearly, this work will be required first to inform the next stage of the SSSI review, i.e. detailing various proposals for potential site linkages for the range restricted species and for improving the entire widespread species network. This document therefore does not include any new guidance at this stage.

5. Results and SSSI Notification Proposals for Amphibians and Reptiles

The results of the above processes have resulted in a limited number of detailed proposals for improving the site series for the range restricted species. In addition, suggestions are made for the gathering of improved evidence that, along with revision to the SSSI and CSM guidelines, will guide future SSSI notification to conserve and enhance amphibians and reptiles

5.1. Characteristics of an Appropriate SSSI Network for Amphibians and Reptiles

Amphibians and reptiles are not uniformly distributed across England, and some areas are significantly more important than others, so the characteristics of an appropriate SSSI network will vary. The following range of broad principles (which should be reflected in the revised guidelines) is

therefore suggested to guide the development of an effective network that will be sufficiently flexible to accommodate different species as well as local and regional variations:

- **Inclusive Approach.** In this situation, the vast majority, if not all, populations of a feature within a particular Area of Search are automatically included in the site series
- **Exemplar Approach.** The best example of a feature within each Area of Search is notified
- **Minimum Standards Approach.** All features that meet the minimum selection criteria in any Area of Search are notified
- **Important Herpetofauna Area (IHA) Approach.** This approach combines elements of all the approaches above and applies them according to the relative importance of an Area of Search to a particular feature. For example, in some areas all examples of a feature would be notified, in others a minimum standard would have to be met and in others the very best example(s) only might suffice. This approach has the potential to more effectively target improvements to the site series for the widespread species in particular.

The benefits of the approaches outlined above to both the range restricted and widespread species are compared in Table 4. In reality, no single approach will produce the ideal site series. There will also be situations, such as great crested newts on farmland, where it would be difficult to include the whole of a metapopulation and all relevant functional habitats within protected sites. Improvements to the site series therefore need to be planned in conjunction with the management of the wider countryside, including the targeting of agri-environment schemes.

Table 4: Proposed Principles for Improving the SSSI Network for Herpetofauna

SSSI Notification Principles	Range Restricted Species	Widespread Species
Inclusive Approach	This approach has already been employed for this group. Also recommended in future to notify new species features on existing SSSIs (e.g. where re-introduced)	May be of use when targeted to key areas for some widespread species features, but probably not appropriate for most Areas of Search
Exemplar Approach	Not relevant	Suitable for some areas but only if good distribution data is available, otherwise there is the potential to notify the “wrong” sites and/or miss opportunities
Minimum Standards Approach	Not relevant	Not appropriate if applied nationally as this could result in huge numbers of SSSIs. In some cases large populations may not need notification in order to ensure their protection (e.g. common toads breeding in fishing lakes) but would benefit from other measures (e.g. amphibian tunnels under roads that cross migration routes)
IHA Approach	Recommended for extending sites to provide linkages and improve resilience. Further planning is required in sensitive areas, e.g. farmland for natterjacks, forestry for sand lizards and smooth snakes. This should be followed by a revision of the SSSI guidance	Recommended in “hot spots” and elsewhere where the widespread species require additional protection, e.g. where key populations are not included in the current site series, or the management of existing SSSIs is clearly damaging important populations

5.2. Evaluation of Features

Table 5 shows the results of the feature evaluation.

Table 5: Amphibian and Reptile Feature Evaluation

Notifiable Feature Name	JNCC Selection Guidelines	Specialist Reviewers	Are SSSIs Required for this Feature?	Do the Existing Guidelines Cover this Feature?	Amendment Required to Guidelines to Add or Remove Feature?
Restricted Range Species					
Natterjack Toad	Amphibians & Reptiles	NE/NRW/SNH/ARC	Yes	Yes	No amendment required
Sand Lizard	Amphibians & Reptiles	NE/NRW/SNH/ARC	Yes	Yes	No amendment required
Smooth Snake	Amphibians & Reptiles	NE/NRW/SNH/ARC	Yes	Yes	No amendment required
Pool Frog	Currently not included	NE/NRW/SNH/ARC	Yes	No	Add feature to guidelines
Widespread Species					
Great Crested Newt	Amphibians & Reptiles	NE/NRW/SNH/ARC	Yes	Yes	No amendment required
Amphibian Assemblage	Amphibians & Reptiles	NE/NRW/SNH/ARC	Yes	Yes	No amendment required
Reptile Assemblage	Amphibians & Reptiles	NE/NRW/SNH/ARC	Yes	Yes	No amendment required
Common Toad	Currently not included	NE/NRW/SNH/ARC	Yes	No	Add feature to guidelines
Adder	Currently not included	NE/NRW/SNH/ARC	Yes	No	Add feature to guidelines

The existing amphibian and reptile features were considered to be satisfactory and there is no requirement to remove any from the SSSI guidelines. However, three new species features are proposed for NE Board consideration, one brand new and two “pulled out” of assemblage features where this is considered to be the most effective way of ensuring their conservation. These new features are:

- **Pool Frog.** The northern clade of this species is considered by many to have once been a native (Buckley & Foster 2005) so has been re-introduced to two sites in Norfolk. Although this decision is still contested, significant expense has already been incurred on these projects so the addition of this species to the guidelines and its subsequent notification (to create a new SSSI for one re-introduction site and to add this species as a feature to an existing SSSI for the other) should be considered
- **Common Toad.** This species can theoretically be protected as part of an amphibian assemblage. However, nationally important populations of common toads can occur without an accompanying amphibian assemblage and, since this species has suffered significant, often unexplained declines (Carrier & Beebee 2003; Hitchens & Beebee 1998; Young & Beebee 2004), it is proposed that it is made a new standalone feature. This proposal has the support of both NRW and SNH

- **Adder.** Similarly, important populations of adders may occur on sites where the wider reptile assemblage doesn't meet the selection criteria for notification. Furthermore, since the adder has been experiencing catastrophic declines in many areas, including county-level extinctions (Baker, Suckling & Carey 2004; Wilkinson & Arnell 2011; 2013), and since many of these losses have seemingly occurred as a result of habitat management within existing SSSIs (Gleed-Owen & Langham 2012), there is a very strong case for the creation of the adder as a standalone feature and the subsequent notification of key populations. This proposal also has the support of NRW and SNH

5.3. Representativeness of the Current SSSI Series

The contrast between the representativeness of the current SSSI series for range restricted species and that for the widespread species is dramatic. In general >90% of the populations of the former are included as features in SSSIs, whereas for widespread species considerably less than 1% of any of their populations are included as features. In addition, the presence of widespread species within SSSIs where they are not notified features has not always ensured their conservation. For example, there is increasing evidence that one threat to the conservation status of the adder in many English SSSIs is habitat management for other features. The current site series and its general representativeness for each current and proposed amphibian and reptile feature is summarised below (NE Responsible Officers are listed for each site for completeness).

5.3.1. Range Restricted Species

5.3.1.i. Natterjack Toad

The natterjack toad, which is also an Annex IV European Protected Species, is a notified feature on 14 SSSIs in England. The majority of its populations occur on sand dunes, upper saltmarsh and lowland heathland and are included within SSSIs, although some use farmland in certain areas.

Table 6: All SSSIs with Natterjack Toad as a Notified Feature

SSSI Name	Date Notified	National Character Area	Responsible Officer
01. Annaside	30.08.1989	7. West Cumbria Coastal Plain	Nicola Evans
02. Cockerham Marsh	16.12.1985	31. Morecambe Coast & Lune Estuary	Margaret Dickinson
03. Drigg Coast	02.05.1986	7. West Cumbria Coastal Plain	Nicola Evans
04. Duddon Estuary	27.02.1991	7. West Cumbria Coastal Plain	Nicola Evans
05. North Norfolk Coast	01.02.1986	77. North Norfolk Coast	John Ebbage
06. Red Rocks	01.11.1983	59. Wirral	Hannah Birtles
07. Saltfleetby-Theddlethorpe Dunes	01.05.1988	42. Lincolnshire Coast & Marshes	Claire Weaver
08. Sefton Coast	16.08.2000	57. Sefton Coast	Margaret Dickinson
09. Silloth Dunes & Mawbray Bank	30.01.1991	6. Solway Basin	Kate Doughty
10. Subberthwaite, Blawith & Torver Low Commons	29.09.1994	19. South Cumbria Low Fells	Matthew Powell
11. Syderstone Common	10.01.1984	76. North West Norfolk	Helen Dixon
12. Upper Solway Flats & Marshes	06.06.1988	6. Solway Basin	Kate Doughty
13. Winterton-Horsey Dunes	01.03.1989	80. The Broads	Adrian Gardiner
14. Woolmer Forest	28.06.1994	120. Wealden Greensand	Harold Makant

While the site series covers populations of natterjacks very well in terms of absolute numbers of breeding adults, it is not as representative when it comes to their overall distribution. A number of smaller populations are excluded in certain IHAs (although some would not qualify for notification under the current selection criteria anyway), particularly some recent introductions and also populations occurring on farmland along the Cumbrian and East Anglian coasts (Table 7).

Table 7: SSSIs in Natterjack Toad “Important Herpetofauna Areas”

Important Herpetofauna Area	Ranking	Associated National Character Area(s)	Number of Natterjack SSSIs	Adequate Coverage by SSSIs?
Cumbria Coast	1	6. Solway Basin	2	No
		7. West Cumbria Coastal Plain	3	
		19. South Cumbria Low Fells	1	
Sefton Coast	2	57. Sefton Coast	1	Yes
East Anglian Coast	3	76. North West Norfolk	1	No
		77. North Norfolk Coast	1	
		78. Central North Norfolk	0	
		79. North East Norfolk & Flegg	0	
		80. The Broads	1	
82. Suffolk Coast & Heaths	0			
Wealden Heaths	4	120. Wealden Greensand	1	No
Dorset Heaths	5	135. Dorset Heaths	0	No

5.3.1.ii. Sand Lizard

A notified feature on 46 SSSIs in England (Table 8), the sand lizard is confined to lowland heathland and a handful of sand dune sites. Also an Annex IV European Protected Species, the site series covers well over 90% of sand lizard populations and is crucial to their continued survival in England.

Table 8: All SSSIs with Sand Lizard as a Notified Feature

SSSI Name	Date Notified	National Character Area	Responsible Officer
01. Ambersham Common	24.10.1986	120. Wealden Greensand	Nigel Hiscoke
02. Arne	30.07.1986	135. Dorset Heaths	Andrew Nicholson
03. Blue Pool & Norden Heaths	01.03.1985	135. Dorset Heaths	Tania Kaplan
04. Bourne Valley	14.03.1995	135. Dorset Heaths	Adam Bates
05. Brenscombe Heath	07.11.1985	135. Dorset Heaths	Andrew Nicholson
06. Broxhead & Kingsley Commons	15.10.1993	120. Wealden Greensand	Cressida Wheelwright
07. Burton Common	26.10.1984	131. New Forest	Simon Curson
08. Canford Heath	12.06.1985	135. Dorset Heaths	Adam Bates
09. Corfe & Barrow Hills	10.03.1986	135. Dorset Heaths	Adam Bates
10. Cranborne Common	23.08.1985	135. Dorset Heaths	Sue Moore
11. Ferndown Common	21.09.1984	135. Dorset Heaths	Adam Bates
12. Gong Hill	01.11.1988	120. Wealden Greensand	Julie Russ
13. Ham Common	11.11.1987	135. Dorset Heaths	Adam Bates
14. Hartland Moor	02.05.1986	135. Dorset Heaths	Andrew Nicholson
15. Hesketh Golf Links	18.12.1989	57. Sefton Coast	Margaret Dickinson
16. Holt & West Moors Heaths	10.07.1988	135. Dorset Heaths	Sue Moore
17. Holton & Sandford Heaths	26.06.1997	135. Dorset Heaths	Andrew Nicholson

SSSI Name	Date Notified	National Character Area	Responsible Officer
18. Horton Common	24.02.1984	135. Dorset Heaths	Adam Bates
19. Hurn Common	17.12.1986	135. Dorset Heaths	Adam Bates
20. Lions Hill	03.05.1985	135. Dorset Heaths	Sue Moore
21. Luscombe Valley	12.03.1996	135. Dorset Heaths	Adam Bates
22. Morden Bog & Hyde Heath	19.02.1996	135. Dorset Heaths	Andrew Nicholson
23. Oakers Bog	29.06.1988	135. Dorset Heaths	Andrew Nicholson
24. Parley Common	24.02.1984	135. Dorset Heaths	Adam Bates
25. Poole Bay Cliffs	06.12.1989	135. Dorset Heaths	Adam Bates
26. Poole Harbour	07.12.1990	135. Dorset Heaths	Andrew Nicholson
27. Povington & Grange Heaths	24.02.1984	135. Dorset Heaths	Andrew Nicholson
28. Puttenham & Crooksbury Commons	31.07.1986	120. Wealden Greensand	Julie Russ
28. Rempstone Heaths	20.02.1987	135. Dorset Heaths	Andrew Nicholson
30. Sefton Coast	16.08.2000	57. Sefton Coast	Margaret Dickinson
31. Slop Bog & Uddens Heath	23.08.1985	135. Dorset Heaths	Sue Moore
32. St Leonards & St Ives Heaths	03.11.1999	135. Dorset Heaths	Sue Moore
33. Stoborough & Creech Heaths	07.02.1986	135. Dorset Heaths	Andrew Nicholson
34. Stokeford Heaths	24.03.1995	135. Dorset Heaths	Andrew Nicholson
35. Studland & Godlingston Heaths	07.10.1986	135. Dorset Heaths	Andrew Nicholson
36. The New Forest	28.02.1996	131. New Forest	Jenny Thomas
37. Thrasher's Heath	31.03.1984	135. Dorset Heaths	Andrew Nicholson
38. Thursley, Hankley & Frensham Commons	23.08.1991	120. Wealden Greensand	Graham Steven
39. Town Common	31.03.1994	135. Dorset Heaths	Helen Powell
40. Turbary & Kinson Commons	08.07.1988	135. Dorset Heaths	Helen Powell
41. Turners Puddle Heath	15.06.1990	135. Dorset Heaths	Andrew Nicholson
42. Upton Heath	12.04.1990	135. Dorset Heaths	Sue Moore
43. Verwood Heaths	08.05.1985	135. Dorset Heaths	Sue Moore
44. Winfrith Heath	05.12.1996	135. Dorset Heaths	Andrew Nicholson
45. Woolmer Forest	28.06.1994	120. Wealden Greensand	Harold Makant
46. Worgret Heath	18.11.1987	135. Dorset Heaths	Andrew Nicholson

Distribution within IHAs is also well covered (Table 9), although a few areas that form key linkages between populations in the Dorset Heaths remain unprotected and some re-introductions have not yet been notified in the Weald and the Thames Basin Heaths. The sand lizard formerly suffered major declines in the latter two NCAs and there is some way to go to re-establish its range there.

Table 9: SSSIs in Sand Lizard “Important Herpetofauna Areas”

Important Herpetofauna Area	Ranking	Associated National Character Area(s)	Number of Sand Lizard SSSIs	Adequate Coverage by SSSIs?
Dorset Heaths	1	135. Dorset Heaths	36	Almost
Wealden Heaths	2	120. Wealden Greensand	6	Almost
Sefton Coast	3	57. Sefton Coast	2	Yes
Thames Basin Heaths	4	129. Thames Basin Heaths	0	No
New Forest	5	131. New Forest	2	Yes

5.3.1.iii. Smooth Snake

Another Annex IV European Protected Species, the smooth snake is completely confined to lowland heathland in a handful of NCAs in southern England where it is a notified feature on 41 SSSIs (Table 10). The representativeness of the SSSI series is good for this species, although its population status is still poorly known.

Table 10: All SSSIs with Smooth Snake as a Notified Feature

SSSI Name	Date Notified	National Character Area	Responsible Officer
01. Arne	30.07.1986	135. Dorset Heaths	Andrew Nicholson
02. Ash To Brookwood Heaths	19.11.1993	129. Thames Basin Heaths	Des Sussex
03. Black Hill Heath	15.12.1989	135. Dorset Heaths/134. Dorset Downs & Cranborne Chase	Andrew Nicholson
04. Blue Pool & Norden Heaths	01.03.1985	135. Dorset Heaths	Tania Kaplan
05. Bourne Valley	14.03.1995	135. Dorset Heaths	Adam Bates
06. Bramshott & Ludshott Commons	26.10.1984	120. Wealden Greensand	Cressida Wheelwright
07. Brenscombe Heath	07.11.1985	135. Dorset Heaths	Andrew Nicholson
08. Burton Common	26.10.1984	131. New Forest	Simon Curson
09. Canford Heath	12.06.1985	135. Dorset Heaths	Adam Bates
10. Corfe & Barrow Hills	10.03.1986	135. Dorset Heaths	Adam Bates
11. Cranborne Common	23.08.1985	135. Dorset Heaths	Sue Moore
12. Ferndown Common	21.09.1984	135. Dorset Heaths	Adam Bates
13. Ham Common	11.11.1987	135. Dorset Heaths	Adam Bates
14. Hartland Moor	02.05.1986	135. Dorset Heaths	Andrew Nicholson
15. Holt & West Moors Heaths	10.07.1988	135. Dorset Heaths	Sue Moore
16. Holton & Sandford Heaths	26.06.1997	135. Dorset Heaths	Andrew Nicholson
17. Hurn Common	17.12.1986	135. Dorset Heaths	Adam Bates
18. Lions Hill	03.05.1985	135. Dorset Heaths	Sue Moore
19. Morden Bog & Hyde Heath	19.02.1996	135. Dorset Heaths	Andrew Nicholson
20. Oakers Bog	29.06.1988	135. Dorset Heaths	Andrew Nicholson
21. Parley Common	24.02.1984	135. Dorset Heaths	Adam Bates
22. Poors Common	30.01.1992	131. New Forest	Simon Curson
23. Povington & Grange Heaths	24.02.1984	135. Dorset Heaths	Andrew Nicholson
24. Puttenham & Crooksbury Commons	31.07.1986	120. Wealden Greensand	Julie Russ
25. Rempstone Heaths	20.02.1987	135. Dorset Heaths	Andrew Nicholson
26. Slop Bog & Uddens Heath	23.08.1985	135. Dorset Heaths	Sue Moore
27. St Leonards & St Ives Heaths	03.11.1999	135. Dorset Heaths	Sue Moore
28. Stoborough & Creech Heaths	07.02.1986	135. Dorset Heaths	Andrew Nicholson
29. Stokeford Heaths	24.03.1995	135. Dorset Heaths	Andrew Nicholson
30. Studland & Godlingston Heaths	07.10.1986	135. Dorset Heaths	Andrew Nicholson
31. The New Forest	28.02.1996	131. New Forest	Jenny Thomas
32. Thrasher's Heath	31.03.1984	135. Dorset Heaths	Andrew Nicholson
33. Thursley, Hankley & Frensham Commons	23.08.1991	120. Wealden Greensand	Graham Steven
34. Town Common	31.03.1994	135. Dorset Heaths	Helen Powell
35. Turbary & Kinson Commons	08.07.1988	135. Dorset Heaths	Helen Powell
36. Turners Puddle Heath	15.06.1990	135. Dorset Heaths	Andrew Nicholson
37. Upton Heath	12.04.1990	135. Dorset Heaths	Sue Moore
38. Verwood Heaths	08.05.1985	135. Dorset Heaths	Sue Moore
39. Warmwell Heath	12.06.1987	135. Dorset Heaths	Andrew Nicholson
40. Winfrith Heath	05.12.1996	135. Dorset Heaths	Andrew Nicholson
41. Woolmer Forest	28.06.1994	120. Wealden Greensand	Harold Makant

Similarly, the distribution of the smooth snake is imperfectly understood, although the SSSI series covers most known populations in the four main National Character Areas where this species occurs (Table 11). Surveys in the New Forest have barely begun to define the distribution, status and movements of the smooth snake within its dynamic heathland habitats there, although of course the whole area is already included within a huge SSSI. The exception is the Thames Basin Heaths NCA where there are a number of sites where smooth snake presence is suspected but has not yet been confirmed, as well as several recent introductions.

Table 11: SSSIs in Smooth Snake “Important Herpetofauna Areas”

Important Herpetofauna Area	Ranking	Associated National Character Area(s)	Number of Smooth Snake SSSIs	Adequate Coverage by SSSIs?
Dorset Heaths	1	135. Dorset Heaths	32	Mostly
New Forest	2	131. New Forest	3	Yes
Wealden Heaths	3	120. Wealden Greensand	4	Mostly
Thames Basin Heaths	4	129. Thames Basin Heaths	1	No

5.3.1.iv. Pool Frog

As the pool frog is currently not a notifiable feature it is not represented in the SSSI site series. Of the two re-introduction sites in Norfolk, one is a non-SSSI forestry site and the other is within an existing SSSI (Thompson Water, Carr and Common). The need to revise the guidance to include this species as a feature should therefore be considered.

5.3.2. Widespread Species

5.3.2.i. Great Crested Newt

The great crested newt occupies a wide variety of habitats, particularly deciduous woodland, grassland and farmland, often on clay soils, and is a notified feature on 36 SSSIs (Table 12). These sites represent only 0.9% of the whole site series. With an estimated 18,000 or so breeding ponds occupied by this species, although some estimates are higher (Wilkinson *et al* 2011) it is clear that, unlike the range restricted species above, the great crested newt would meet the selection criteria on many more sites, probably hundreds, and is therefore is not well represented by the site series.

On top of the poor national representation within the site series, great crested newt SSSIs have also been poorly targeted, with over-emphasis being given to old quarries and mineral sites (this is partly due to the current selection criteria), rather than to the important metapopulations that, for example, occupy significant “pondscapes” in the three largest IHAs for this species. It can be seen from Table 13 that only five of the 36 great crested newt SSSIs occur within these internationally important hotspots. All the available evidence points to large declines of great crested newts in the wider countryside but, while a great deal of attention has been paid to dealing with development mitigation issues caused by this species, very little has been focussed on its conservation.

Table 12: All SSSIs with Great Crested Newt as a Notified Feature

SSSI Name	Date Notified	National Character Area	Responsible Officer
01. Annesley Woodhouse Quarries	22.06.2010	30. Southern Magnesian Limestone	Ruth Tall
02. Beeding Hill to Newtimber Hill	10.11.1986	125. South Downs	Nigel Hiscoke
03. Bee's Nest & Green Clay Pits	18.07.1990	52. White Peak	Ruth Keeley
04. Blue Pool & Norden Heaths	01.03.1985	135. Dorset Heaths	Tania Kaplan
05. Chanctonbury Hill	08.03.1985	125. South Downs	Susan Simpson
06. Clints Quarry, Moota	03.02.1997	8. Cumbria High Fells	Matthew Powell
07. Crookhill Brick Pit	25.11.2003	138. Weymouth Lowlands	Ruth Carpenter
08. Denby Grange Colliery Ponds	29.09.1997	38. Nottinghamshire, Derbyshire & Yorkshire Coalfield	Michelle Dickinson
09. Dew's Ponds	18.08.2000	83. South Norfolk & High Suffolk Claylands	Matthew Ginn
10. Drewton Lane Pits	28.05.1993	27. Yorkshire Wolds	Chris McGregor
11. Dungeness, Romney Marsh & Rye Bay	16.08.2006	123. Romney Marshes	Jo Dear
12. Fens Pools	27.09.1989	67. Cannock Chase & Cank Wood	Tracey Hill
13. Fritton Common	01.10.1985	83. South Norfolk & High Suffolk Claylands	Emily Swan
14. Hockering Wood	01.09.1984	84. Mid Norfolk	Emily Swan
15. Holnest	03.02.2004	133. Blackmoor Vale & Vale of Wardour	Sean Cooch
16. Houghton Regis Marl Lakes	01.06.1988	110. Chilterns	Justin Tilley
17. Kirk Deighton	16.08.2000	30. Southern Magnesian Limestone	Michelle Dickinson
18. Little Wittenham	16.08.2000	108. Upper Thames Clay Vales	Alison Muldal
19. Lyppard Grange Ponds	16.08.2000	106. Severn & Avon Vales	Danielle Newman
20. New Hartley Ponds	01.01.1985	13. South East Northumberland Coastal Plain	Monique Speksnyder
21. Orton Pit	23.03.2004	88. Bedfordshire & Cambridgeshire Claylands	Justin Tilley
22. Peter's Pit	16.08.2000	119. North Downs	Phil Williams
23. Powerstock Common & Wytherston Farm	25.02.2000	139. Marshwood & Powerstock Vales	Sean Cooch
24. Ripon Parks	01.02.1983	30. Southern Magnesian Limestone	Joanne Newton
25. Rixton Clay Pits	12.12.1990	60. Mersey Valley	Paul Thomas
26. Salisbury Plain	29.01.1993	132. Salisbury Plain & West Wiltshire Downs	Sarah Grinsted
27. Sefton Coast	16.08.2000	57. Sefton Coast	Margaret Dickinson
28. Silloth Dunes & Mawbray Bank	30.01.1991	6. Solway Basin	Kate Doughty
29. Southampton Common	24.02.1987	128. South Hampshire Lowlands	Charlotte Rose
30. Stones Road Pond	20.06.1985	114. Thames Basin Lowlands	Georgina Terry
31. Sundon Chalk Quarry	01.05.1989	110. Chilterns	Justin Tilley
32. Swannington Upgate Common	01.12.1985	78. Central North Norfolk	Dave Weaver
33. The New Forest	28.02.1996	131. New Forest	Jenny Thomas
34. Thompson Water, Carr & Common	01.10.1988	85. The Brecks	Helen Edmondson
35. Wilsford & Rauceby Warrens	01.05.1986	47. Southern Lincolnshire Edge	Delphine Suty
36. Yardley Chase	26.07.1984	91. Yardley Whittlewood Ridge	Nicola Orchard

Table 13: SSSIs in Great Crested Newt “Important Herpetofauna Areas”

Important Herpetofauna Area	Ranking	Associated National Character Area(s)	Number of Great Crested Newt SSSIs	Adequate Coverage by SSSIs?
Northwestern Claylands (One SSSI)	1	32. Lancashire & Amounderness Plain	0	No
		56. Lancashire Coal Measures	0	
		59. Wirral	0	
		60. Mersey Valley	1	
		61. Shropshire, Cheshire & Staffordshire Plain	0	
		68. Needwood & South Derbyshire Claylands	0	
East Anglian Claylands (Four SSSIs)	2	83. South Norfolk & High Suffolk Claylands	2	No
		84. Mid Norfolk	1	
		86. South Suffolk & North Essex Claylands	0	
		88. Bedfordshire and Cambridgeshire Claylands	1	
		111. Northern Thames Basin	0	
Wealden Claylands (One SSSI)	3	121. Low Weald	0	No
		122. High Weald	0	
		123. Romney Marshes	1	
		124. Pevensey Levels	0	

As an Annex II (as well as Annex IV) European Protected Species there is also a requirement to notify SACs for this species – great crested newts are a primary feature on 15 SACs in England and a qualifying feature on a further nine, all of which are underpinned by the SSSI series shown in Table 12. Although this is far lower than the number of great crested newt SACs in other EU countries (Germany has over 800), the European Commission has made it clear that conservation of this species through well targeted agri-environment schemes is a suitable alternative to site protection, especially on farmland where extensive notification would be politically difficult.

However, agri-environment schemes, even the Higher Level Stewardship Scheme, have not delivered obvious benefits for great crested newt conservation in England. Defra’s Great Crested Newt Task Force has estimated that the creation of at least 5,000 new ponds is necessary for achieving Favourable Conservation Status for this species. The capital items for creating new ponds that were available in HLS, along with capital items for the restoration of existing ponds, annual options for maintaining ponds of high wildlife value and a range of suitable terrestrial options, all clearly had the potential for contributing to this aspiration and greatly enhancing conservation efforts for this species. Unfortunately, the rate of creation of any new ponds in HLS has been very low (less than 2% of all agreements) and, furthermore, the percentage of these new ponds that were created specifically for great crested newts appears to have been zero (Table 14).

Table 14 summarises GenRep data for all HLS agreements with start dates between 1st January 2005 and 1st December 2014 showing uptake of the following six pond options/capital items:

- **HQ1** Maintenance of ponds of high wildlife value < 100 sq m
- **HQ2** Maintenance of ponds of high wildlife value > 100 sq m
- **PC** Pond creation, first 100 sq m
- **PCP** Pond creation > 100 sq m
- **PR** Pond restoration, first 100 sq m
- **PRP** Pond restoration > 100 sq m

The total number of HLS agreements during this period was 14,097, of which 660 (4.68%) had at least one aquatic or terrestrial option/capital item linked to great crested newts (GCN) in Genesis.

Table 14: Total Numbers of HLS agreements with Pond Options

HLS Option/ Capital Item	No. of HLS agreements* in England with a pond option/capital item	% of all HLS agreements in England (14,097)	No. of HLS agreements* with a pond option/capital item linked to GCN	% of HLS agreements with this pond option/capital item linked to GCN	% of all HLS agreements in England (14,097)
HQ1	692	4.9	117	16.9	0.8
HQ2	1,123	8.0	157	14.0	1.1
PC	239	1.7	0	0	0
PCP	145	1.0	0	0	0
PR	398	2.8	0	0	0
PRP	287	2.0	0	0	0

*Agreements not totalled as some HLS agreements may include several different pond options. Note that an individual HLS agreement may include other ponds with no options/capital items applied.

Although the great crested newt should benefit from the Farm Wildlife Package available for the Higher Tier of the new Countryside Stewardship scheme, and the specific targeting of the great crested newt hotspots shown in Table 13 will also be available, this scheme will cover a much smaller area than Environmental Stewardship. In addition, there will be no pond creation options available in the Middle Tier of Countryside Stewardship and the encouragement of pond creation in Ecological Focus Areas is not a feature of the Basic Payment Scheme. Consideration should therefore be given to SSSI notification playing a greater part in great crested newt conservation, especially if we are to satisfy our obligations under the Habitats Directive.

5.3.2.ii. Amphibian Assemblage

This feature is barely represented by the site series, with a mere 15 SSSIs (0.4% of the total) having an amphibian assemblage feature. Since the widespread amphibians occur throughout England, often in significant but increasingly vulnerable assemblages, it is somewhat surprising that this figure is not much higher.

Table 15: All SSSIs with Amphibian Assemblage as a Notified Feature

SSSI Name	Date Notified	National Character Area	Notified Herp Features
01. Annesley Woodhouse Quarries	22.06.2010	30. Southern Magnesian Limestone	Ruth Tall
02. Bewick & Beanley Moors	30.06.2010	2. Northumberland Sandstone Hills	Steve Pullan
03. Denby Grange Colliery Ponds	29.09.1997	38. Nottinghamshire, Derbyshire & Yorkshire Coalfield	Michelle Dickinson
04. Drewton Lane Pits	28.05.1993	27. Yorkshire Wolds	Chris McGregor
05. Drigg Coast	02.05.1986	7. West Cumbria Coastal Plain	Nicola Evans
06. Epping Forest	05.03.1990	111. Northern Thames Basin	Neil Fuller
07. Fens Pools	27.09.1989	67. Cannock Chase & Cank Wood	Tracey Hill
08. Gibside	01.06.1989	16. Durham Coalfield Pennine Fringe	Amanda Hunter
09. New Hartley Ponds	01.01.1985	13. South East Northumberland Coastal Plain	Monique Speksnyder
10. Offham Marshes	21.03.1989	121. Low Weald	Robin Kelly
11. Pockerley Farm Pond	01.11.1984	16. Durham Coalfield Pennine Fringe	Sarah Bolton
12. Priddy Pools	21.04.1986	141. Mendip Hills	Justin Gillett
13. Southampton Common	24.02.1987	128. South Hampshire Lowlands	Charlotte Rose
14. The New Forest	28.02.1996	131. New Forest	Jenny Thomas
15. Thompson Water, Carr & Common	01.10.1988	85. The Brecks	Helen Edmondson

5.3.2.iii. Reptile Assemblage

Although reptiles are increasingly under threat from a range of factors, even fewer SSSIs support a notified reptile assemblage feature - just six sites (0.1% of the total number of sites).

Table 16: All SSSIs with Reptile Assemblage as a Notified Feature

SSSI Name	Date Notified	National Character Area	Responsible Officer
01. Bickerton Hill	13.12.1999	62. Cheshire Sandstone Ridge	Stuart Morris
02. Gibside	01.06.1989	16. Durham Coalfield Pennine Fringe	Amanda Hunter
03. The New Forest	28.02.1996	131. New Forest	Jenny Thomas
04. Woolbeding & Pound Commons	22.09.1998	120. Wealden Greensand	Carol Mortimer
05. Woolmer Forest	28.06.1994	120. Wealden Greensand	Harold Makant
06. Wyre Forest	08.04.1998	66. Mid Severn Sandstone Plateau	Francis Flanagan

5.3.2.iv. Common Toad

Since the common toad is currently not a notifiable feature it is not represented in the SSSI site series. Revision of the guidelines to add the common toad as a standalone notifiable feature, rather than as part of an amphibian assemblage (especially as other species would not meet the selection criteria on many toad breeding ponds), would start to address the huge recent declines being suffered by this species.

5.3.2.v. Adder

Information obtained from Evidence suggests that the adder is already a notified feature on a single SSSI in England (Table 17), although as this species is not included in the current guidelines this should not be technically possible at the moment. The adder has therefore not been included in Table 1 or Appendix 2 as a formal feature. However, since revision of the guidelines to allow notification of this species in its own right is proposed this anomaly will hopefully be rectified soon.

Table 17: All SSSIs with Adder thought to be a Notified Feature

SSSI Name	Date Notified	National Character Area	Responsible Officer
01. Eastern Peak District Moors	22.12.1999	51. Dark Peak	Jenny Parker

5.4. Identification of Site Amendments Required

Thanks to the MoA work with Amphibian and Reptile Conservation, it has been possible to provide detailed information about potential site amendments required for certain species features – this includes suggested changes for the sand lizard and smooth snake right down to the level of SSSI units. At this stage, the identification of required site amendments is only possible for the range restricted species. The information provided here also separates necessary improvements to the existing site series from suggested amendments to subsequently expand the site series. It is clearly essential to ensure that what we currently have is working properly before enlarging it!

As far as improvements to the current situation is concerned, a requirement common to all notified amphibian and reptile features is the need to revise the site's Favourable Condition Table (FCT) in order to define Favourable Condition. In many cases the national guidance has simply been pasted into the FCT, with no attempt made to set any clear, site-specific objectives for any attributes. Rectifying this problem would facilitate effective condition monitoring of amphibian and reptiles features (which had almost never been carried out on any site prior to the MoA work with ARC starting in 2012/13), although the CSM guidance itself also requires revision. However, before any improvements can be made to existing sites further survey work will often be required to elucidate the distribution of individual species as reportable features in SSSI units (e.g. Tables 18 and 19).

Some amendments to subsequently expand the site series will be straightforward, e.g. adding a feature to an existing SSSI following a successful re-introduction. Others, especially SSSI extensions into forestry or farmland, will require further detailed evidence gathering and planning before progress can be attempted.

5.4.1. Improving the Existing Site Series for Range Restricted Species

5.4.1.i. Natterjack Toad

Site units for natterjack toads have not been examined in detail yet.

5.4.1.ii. Sand Lizard

Table 18 lists the units on all sand lizard SSSIs where this species is already a reportable feature and suggests further units where it could also be present. Although the sand lizard is comparatively well studied, reptile monitoring can be extremely difficult and time consuming and further surveys are still required for this species on 19 (41%) of the 46 SSSIs where it is a notified feature. These include two sites, Burton Common SSSI and Slop Bog & Uddens Heath SSSI, where it is thought the sand lizard has been lost (for unknown reasons).

Table 18: Improving Existing SSSIs with the Sand Lizard as a Notified Feature

SSSI Name	Current Site Units	Potential New Units	Notes
01. Ambersham Common	5,10	6,9,11	Further surveys required
02. Arne	4,6,7,8,10,12,13,15	1,2	Further surveys required
03. Blue Pool & Norden Heaths	1,2,3,4,7,11,12	-	Distribution fairly well known
04. Bourne Valley	1,2,6,8,9,10	-	Distribution fairly well known
05. Brenscombe Heath	1	2,3	Further surveys required
06. Broxhead & Kingsley Commons	2	-	Distribution fairly well known
07. Burton Common	1,2?	?	Further surveys required. Species has probably been lost from site, reintroduction planned if confirmed
08. Canford Heath	1,2,3,4,5,6,7,9,12,13,15,16	-	Distribution fairly well known
09. Corfe & Barrow Hills	3,5,6,8,9	-	Distribution fairly well known
10. Cranborne Common	4,11	1	Further surveys required
11. Ferndown Common	1,2,3,4	-	Distribution fairly well known
12. Gong Hill	1,2	-	Distribution fairly well known
13. Ham Common	1,2,3,4,5,6	-	Distribution fairly well known
14. Hartland Moor	1,2,3,4,5,6,9,10,11,12,17	18	Further surveys required
15. Hesketh Golf Links	1	-	Distribution fairly well known
16. Holt & West Moors Heaths	5,7,9,11,14,15,16,17,19	6,22,23	Further surveys required
17. Holton & Sandford Heaths	7,8,12,14,15,16,18,20,22	6,11	Further surveys required
18. Horton Common	1,2	-	Distribution fairly well known
19. Hurn Common	28,29	-	Distribution fairly well known
20. Lions Hill	1,2	-	Distribution fairly well known
21. Luscombe Valley	1,2,3,4	-	Distribution fairly well known
22. Morden Bog & Hyde Heath	1,2,6,7,9,10,11,12,13,14,15,16,18,19,20,22,23,24,25,28,29,30,32,33,34,35,36,37,38	39,40	Further surveys required

SSSI Name	Current Site Units	Potential New Units	Notes
23. Oakers Bog	2,3	-	Distribution fairly well known
24. Parley Common	5,6,10,11,12,16,21,22,23,25,27	-	Distribution fairly well known
25. Poole Bay Cliffs	1,2,7,8	-	Distribution fairly well known
26. Poole Harbour	18,19,20	-	Distribution fairly well known
27. Povington & Grange Heaths	1,8,11,13,15,26,27,29,30	14,23,24,25	Further surveys required
28. Puttenham & Crooksbury Commons	6	-	Distribution fairly well known
28. Rempstone Heaths	4,5,6,12,16,18,19,22,23,24,25	28	Further surveys required
30. Sefton Coast	7,8,9,10,11,12,13,14,15,16,16,17,18,19,20,21,22,23,24,25,26	-	Distribution fairly well known
31. Slop Bog & Uddens Heath	1,4,7?	?	Further surveys required. Species has probably been lost from site, reintroduction planned if confirmed
32. St Leonards & St Ives Heaths	3,6,7,9,10,11,13,14,17,18,19,20,21,22,23,24,28,30,31	5,8,12,26,27	Further surveys required
33. Stoborough & Creech Heaths	1,3,4,6,7,9,10,14	2	Further surveys required
34. Stokeford Heaths	1,2,3,5,6,7,8,9,11,14	4,10,12,13	Further surveys required
35. Studland & Godlingston Heaths	2,3,4,5,7,11,13,17	-	Distribution fairly well known
36. The New Forest	120,338,505,531	226,230	Further surveys required
37. Thrasher's Heath	2,4	-	
38. Thursley, Hankley & Frensham Commons	3,4,6,11,12,13,16,27,28,29,45	18,32	Further surveys required
39. Town Common	1,2,3,4,5,6,7,8,9,10,13,14,16,17,18,19,20,21,24,25	-	Distribution fairly well known
40. Turbary & Kinson Commons	1,2,3	-	Distribution fairly well known
41. Turners Puddle Heath	3,4,5,8,9,10,11,12,13,14,17	6,7	Further surveys required
42. Upton Heath	4,7,8,9,10,12,13,14,15,16,17,18,19,21,23	-	Distribution fairly well known
43. Verwood Heaths	1,2,3	-	Distribution fairly well known
44. Winfrith Heath	2,4,7	-	Distribution fairly well known
45. Woolmer Forest	12,13,16,23,28,31	17,20,24	Further surveys required
46. Worgret Heath	1,2	-	Distribution fairly well known

5.4.1.iii. Smooth Snake

The smooth snake is an elusive and particularly difficult species to monitor so it is no surprise that even more additional survey work is required on more sites, and a lot more units, than for the sand lizard. Further surveys are therefore required on 30 (73%) of the 41 SSSIs where it is a notified feature. These include two sites (Burton Common and Slop Bog & Uddens Heath again), where it is thought the smooth snake has been lost and two sites where its status is currently unknown.

Table 19: Improving Existing SSSIs with the Smooth Snake as a Notified Feature

SSSI Name	Current Site Units	Potential New Units	Notes
01. Arne	4,6,7,8,10	1,2,5,12,13,15	Further surveys required
02. Ash To Brookwood Heaths	13,16	-	Distribution fairly well known
03. Black Hill Heath	1	-	Distribution fairly well known
04. Blue Pool & Norden Heaths	3,4,11	2,7,12	Further surveys required
05. Bourne Valley	1,6,8,9,11,12	-	Distribution fairly well known
06. Bramshott & Ludshott Commons	?	?	Further surveys required. Status and distribution on site unknown
07. Brenscombe Heath	?	1,2,3	Further surveys required
08. Burton Common	1,2	?	Further surveys required. Species has probably been lost from site, reintroduction planned if confirmed
09. Canford Heath	1,2,3,4,5,6,7,9,12,13,15,16	-	Distribution fairly well known
10. Corfe & Barrow Hills	2,3,4,5,6,8,9	-	Distribution fairly well known
11. Cranborne Common	1,3,11	2,4,5	Further surveys required
12. Ferndown Common	1,2	3,4	Further surveys required
13. Ham Common	1,3,4,5,6	2	Further surveys required
14. Hartland Moor	1,2,3,4,5,9,10,11,12,17	6,7,8,18	Further surveys required
15. Holt & West Moors Heaths	5,7,9,10,11,23	4,6,14,15,16,17,19,22,24,25	Further surveys required
16. Holton & Sandford Heaths	7,8,14,18,20,22	6,11,15,16	Further surveys required
17. Hurn Common	28,29	-	Distribution fairly well known
18. Lions Hill	1,2	3	Distribution fairly well known
19. Morden Bog & Hyde Heath	1,2,5,6,7,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,27,28,29,30,32,33,34,35,36,37,38	8,39,40,42	Further surveys required
20. Oakers Bog	2,3	-	Distribution fairly well known
21. Parley Common	5,6,11,12,14,21,22,23,27	4,19,20	Further surveys required
22. Poors Common	?	?	Further surveys required. Status and distribution on site unknown
23. Povington & Grange Heaths	1,8,11,13,27,29	2,10,14,15,21,22,23,24,25,26,28,30	Further surveys required
24. Puttenham & Crooksbury Commons	6	-	Distribution fairly well known
25. Rempstone Heaths	4,5,6,9,11,12,16,18,19,20,23,24,25	3,28	Further surveys required
26. Slop Bog & Uddens Heath	1,4,7	5	Further surveys required
27. St Leonards & St Ives Heaths	19,22,23,24,30,31	3,4,5,6,7,8,9,10,11,12,13,14,17,18,20,21,26,27,28	Further surveys required
28. Stoborough & Creech Heaths	3,6,7,9,10,14	1,2,4	Further surveys required
29. Stokeford Heaths	1,2,3,4,6,7,8,9,10,11,12,14	5,13	Further surveys required
30. Studland & Godlingston Heaths	1,2,3,4,5,7,11,13,17	-	Further surveys required

SSSI Name	Current Site Units	Potential New Units	Notes
31. The New Forest	?	?	Further surveys required. Status and distribution very poorly known (e.g. less than 20% of the 425 km squares that support potential heathland habitat in the SSSI have been adequately surveyed)
32. Thrasher's Heath	4	2	Further surveys required
33. Thursley, Hankley & Frensham Commons	3,11,12,13,16,27,28,32	4,6,18,26,39,44,45	Further surveys required
34. Town Common	3,4,5,6,7,8,9,16,17,18,19,20,24,25	1,2,10	Further surveys required
35. Turbary & Kinson Commons	2,3	-	Distribution fairly well known
36. Turners Puddle Heath	3,4,5,7,11,12,13,14,17	1,2,6,8,9,10,16	Further surveys required
37. Upton Heath	4,7,8,9,10,12,13,14,15,16,17,18,19,20,21,22,23	3,28	Further surveys required
38. Verwood Heaths	1,2,3	-	Distribution fairly well known
39. Warmwell Heath	4	1,2	Further surveys required
40. Winfrith Heath	2,4,7,8,9,11	10,14	Further surveys required
41. Woolmer Forest	20,23,27,28,31	12,13,16,17,22,24,25,26,29,32,33,34,35,36,37	Further surveys required

5.4.2. Expanding the Site Series for Range Restricted Species

5.4.2.i. Natterjack Toad

The distribution of the natterjack toad is not fully understood in the few areas (especially along the west Cumbrian and Solway coasts) where it occurs outside existing SSSIs. The potential expansions to existing sites listed in Table 20 are therefore provisional and are subject to change as new information comes to light. Some of these changes will require further detailed evidence gathering and planning and all opportunities, e.g. provided by “spreading room” along the Cumbria coastal path, should be explored.

Much simpler will be the addition of the natterjack toad as a notified feature to the 10 sites where re-introductions have taken place in recent years. Some re-introductions are not yet well established, however, so this process should be informed by continued monitoring over several more years.

Since most additional site protection for the natterjack toad feature (mainly to improve linkages and population resilience) will be provided by the extension of existing site boundaries, only three completely new SSSIs are likely to be proposed for the natterjack toad. Further details have yet to be worked out but these will probably be the natterjack site adjacent to Sellafeld, Braystones and Whitbeck, which are all located in the West Cumbria Coastal Plain NCA.

Table 20: Expanding the Existing SSSI Series for the Natterjack Toad

SSSI Name	National Character Area	Amendment Required	Reason*	Significance
Annaside	7. West Cumbria Coastal Plain	Extend SSSI boundary	Site linkage & ecological coherence	High (extend inland & north to Eskmeals)
Annaside & Gutterby Banks	7. West Cumbria Coastal Plain	Add as feature & extend SSSI boundary	Site linkage & ecological coherence	High (extend south to Silecroft to include Gutterby and Summer Hill)
Christchurch Harbour	135. Dorset Heaths	Add as feature	Reintroduction	Medium (county significant, well established)
Drigg Coast	7. West Cumbria Coastal Plain	Extend SSSI boundary	Site linkage & ecological coherence	High (extend north to Whitriggs and south to Eskmeals MoD)
Duddon Estuary	7. West Cumbria Coastal Plain	Extend SSSI boundary	Site linkage & ecological coherence	High (extend north to Silecroft)
Frensham Common	120. Wealden Greensand	Add as feature	Reintroduction	High (species established?)
Frilford Heath, Ponds & Fens	109. Midvale Ridge	Add as feature and extend SSSI boundary	Reintroduction	High (species established?)
Gibraltar Point	42. Lincolnshire Coast & Marshes	Add as feature	Reintroduction	High (species established)
Minsmere-Walberswick Heaths & Marshes	82. Suffolk Coast & Heaths	Add as feature	Reintroduction	High (species established)
Potton Hall Fields, Westleton	82. Suffolk Coast & Heaths	Add as feature	Reintroduction	Low (species established?)
Sandwich Bay to Hacklinge Marshes	113. North Kent Plain	Add as feature	Reintroduction	Low (species established?)
Sandy Warren	90. Bedfordshire Greensand Ridge	Add as feature	Reintroduction	High (species established)
Silloth Dunes & Mawbray Bank	6. Solway Basin	Extend SSSI boundary	Site linkage & ecological coherence	High (extend south to Allonby)
Sizewell Marshes	82. Suffolk Coast & Heaths	Add as feature and extend SSSI boundary	Reintroduction	High (species established)
Woolmer Forest	120. Wealden Greensand	Extend SSSI boundary	Site linkage & ecological coherence	Medium (improve Woolmer to Blackmoor link)

*N.B. potential release sites where reintroductions are planned but have not yet occurred, or where the species has not become established, are not considered in this review

5.4.2.ii. Sand Lizard

Additional sand lizard features could be added fairly simply to 15 existing SSSIs where re-introductions have occurred in recent years (Table 21). Less straightforward will be the extension of existing sand lizard sites into forestry or mineral restoration areas in order to link existing sites and maintain population resilience. The amendments listed in Table 20 are therefore provisional proposals only and proceeding any further down this route would require additional planning as well as revision of the SSSI guidelines to reflect the different boundary setting requirements.

As for the natterjack toad, most of the potential expansion of the site series will be delivered by extending existing sites and very few new SSSIs are currently thought necessary (this may be subject to change in light of future survey work). These sites are Hambledon Common and Hurtwood, which are both located in the Wealden Greensand NCA, plus part of the Puddletown area in the Dorset Heaths.

Table 21: Expanding the Existing SSSI Series for the Sand Lizard

SSSI Name	National Character Area	Amendment Required	Reason*	Priority
Ash to Brookwood Heaths	129. Thames Basin Heaths	Add as feature (units 13,16)	Reintroduction	High (established population, large unit areas)
Blackheath	120. Wealden Greensand	Add as feature	Reintroduction	High (species well established)
Bourne Valley	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Low (potential development mitigation area)
Bramshott & Ludshott Commons	120. Wealden Greensand	Add as feature	Reintroduction	Medium (limited area at present, although good future potential)
Braunton Burrows	145. Exmoor	Add as feature	Reintroduction	High (county significant, large unit area)
Chichester Harbour	126. South Coast Plain	Add as feature	Reintroduction	Medium (county significant, species established, but small unit area)
Chobham Common	129. Thames Basin Heaths	Add as feature	Reintroduction	High (established population, large unit areas)
Climping Beach	126. South Coast Plain	Add as feature	Reintroduction	Low (small unit area, species established?)
Colony Bog & Bagshot Heath	129. Thames Basin Heaths	Add as feature	Reintroduction	Low (limited unit area, population isolated)
Christchurch Harbour	135. Dorset Heaths	Add as feature	Reintroduction	Low (small unit area, species established?)
Cranborne Common	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan area)
Dawlish Warren	148. Devon Redlands	Add as feature	Reintroduction	Medium (county significant though severe erosion)

SSSI Name	National Character Area	Amendment Required	Reason*	Priority
Hurn Common	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Low (Forest Design Plan area)
Lavington Common	120. Wealden Greensand	Add as feature	Reintroduction	Medium (county significant and established, but small unit area)
Leith Hill	120. Wealden Greensand	Add as feature	Reintroduction	Low (small unit area, recent reintroduction)
Morden Bog & Hyde Heath*	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan and mineral restoration areas)
Ockham & Wisley Commons	129. Thames Basin Heaths	Add as feature	Reintroduction	Medium (species established)
Rempstone Heaths	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	High (Forest Design Plan area)
Sandwich Bay to Hacklinge Marshes	113. North Kent Plain	Add as feature	Reintroduction	Medium (county significant)
St. Leonards & St. Ives Heaths*	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (potential development mitigation area)
Stokeford Heaths	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan and mineral restoration areas)
Treose Head & Constantine Bay	152. Cornish Killas	Add as feature	Reintroduction	Medium (county significant but small unit area)
Turners Puddle Heath (& Oakers Bog?)	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan and mineral restoration areas)
Verwood Heaths	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	High (Forest Design Plan and mineral restoration areas)

*N.B. SSSIs where reintroductions are planned but have not yet occurred, or where the species has not become established, are not considered in this review

5.4.2.iii. Smooth Snake

Because they are features together on so many heathland sites, most of the amendments suggested for the smooth snake in Table 22, as well as the problems likely to be encountered, are similar to those for the sand lizard. Re-introductions to sites in its former range are inherently more difficult for the smooth snake so its addition as a new feature is only proposed for four existing SSSIs. There are many other sites where the presence of this species is suspected, but not yet confirmed, or where the potential for future re-introduction is being investigated. In addition, three brand new SSSIs at Hurtwood, in the Wealden Greensand NCA, and the Puddletown and Warmwell-Redbridge areas in the Dorset Heaths, should also be considered.

Table 22: Expanding the Existing SSSI Series for the Smooth Snake

SSSI Name	National Character Area	Amendment Required	Reason*	Priority
Ambersham Common	120. Wealden Greensand	Add as feature	Reintroduction	High (county significant, species well established)
Blackheath	120. Wealden Greensand	Add as feature	Reintroduction	High (species well established)
Bourne Valley	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Low (potential development mitigation area)
Chobham Common	129. Thames Basin Heaths	Add as feature	Reintroduction	High (established population, large unit areas)
Cranborne Common	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan area)
East Devon Pebblebed Heaths	148. Devon Redlands	Add as feature	Reintroduction	Low (small unit area, species established?)
Hurn Common	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Low (Forest Design Plan area)
Morden Bog & Hyde Heath*	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan and mineral restoration areas)
Rempstone Heaths	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	High (Forest Design Plan area)
St. Leonards & St. Ives Heaths*	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (potential development mitigation area)
Stokeford Heaths	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan and mineral restoration areas)
Turners Puddle Heath (& Oakers Bog?)	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (Forest Design Plan and mineral restoration areas)
Verwood Heaths	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	High (Forest Design Plan and mineral restoration areas)
Warmwell Heath	135. Dorset Heaths	Extend SSSI boundary	Site linkage & ecological coherence	Medium (mineral restoration area)

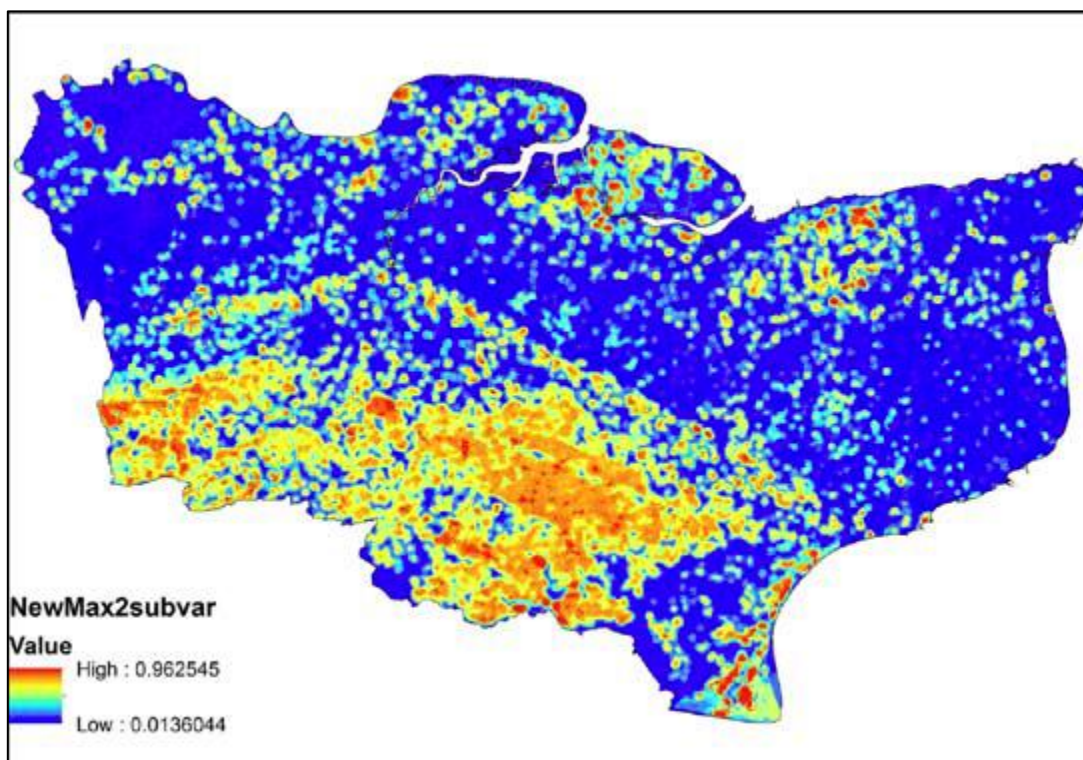
*N.B. potential release sites where reintroductions are planned but have not yet occurred, or where the species has not become established, are not considered in this review

5.4.3. Widespread Species

It is no exaggeration to state that a site series for widespread species features virtually needs to be started from scratch. However, due to a severe lack of information, it is not currently possible to identify the potential amendments and additions required to achieve this. This would first require a revision of the guidelines followed by a major data gathering exercise. Resources to obtain this evidence will obviously be severely limited for the foreseeable future, but fortunately both Amphibian & Reptile Conservation and the voluntary Amphibian and Reptile Groups (ARGs) have expressed an interest in assisting with this exercise should it proceed. Indeed, a lot of extremely useful survey data already exists among the ARGs although as Natural England stopped supporting herpetofauna volunteer engagement in 2012 this information is currently not available to inform our SSSI notification review work. The potential for supporting ARC in developing a new, volunteer based survey and monitoring programme for all native herpetofauna is therefore worth exploring further.

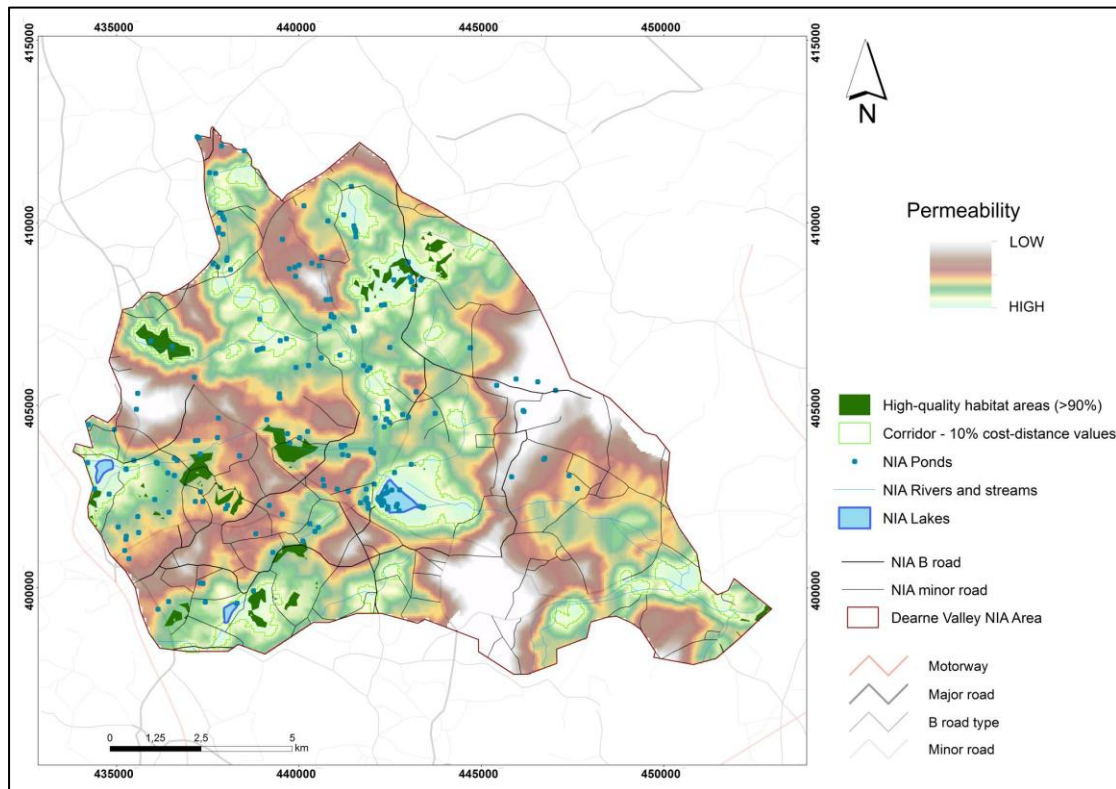
In addition to developing volunteer engagement, other cost effective solutions for improving evidence about widespread species should also be considered. While they can never replace field surveys, techniques such as remote sensing and species distribution modelling (Arnell & Wilkinson 2011) have significant potential for highlighting the best areas within NCAs and for the more effective targeting of surveys. Figures 3 and 4 illustrate typical outputs being generated in this area.

Figure 3: ARC Great Crested Newt Species Distribution Model for Kent*



*This is a fine-scale (25m resolution) absolute model that gives a relative description within areas that are positively (red) and negatively (blue) correlated with great crested newt. The Wealden Claylands “Important Herpetofauna Area” for great crested newts (Table 13) can clearly be seen below the line of the North Downs and running south-east to Dungeness. Output generated by ARC Trust using MaxEnt for an ARC-Natural England Great Crested Newt MoA (2013-14)

**Figure 4: Potential Common Toad Migration Routes in the Dearne Valley NIA*
(Matos & Petrovan 2012)**



*This model shows least-cost corridors for common toad movements between high-value habitat patches (dark green) and water bodies (blue) in the Dearne Valley NIA. Permeability is also represented by a colour scale ranging from brown (low permeability) to light green (high permeability). Road location is shown, allowing modelling of potential road mortality hotspots for migrating toads, connectivity between protected sites, etc. (Froglife-Natural England contract 2012).

5.5. Revising the SSSI Guidelines

In order to achieve many of the desired outcomes of the SSSI notification review, both to ensure species resilience in the face of climate change and other threats (Dunford & Berry 2012; Russell 2012) and to reduce the likelihood of external challenge to site notifications, it is quite clear that the current guidelines (JNCC 2012) need to be revised and improved. Some changes will be minor but others would be more significant, e.g. the site selection and boundary setting criteria for great crested newts need a major rethink as they currently favour former mineral/quarry sites over other habitats. The addition of new species features also needs to be reflected in this guidance. Basically, a brand new chapter for the herpetofauna is required. We have already been working on ideas through our former MoA with ARC and various proposals for improving both the SSSI and CSM guidance have been discussed and agreed at a workshop with NRW and SNH.

6. Next Steps and Future Issues

The single most important issue is the lack of evidence. Currently, we lack the resources to even carry out condition monitoring of existing notified amphibian and reptile features, let alone fill in the very significant evidence gaps for these taxa. The next steps in improving the site series for amphibians and reptiles will therefore be dictated by the requirement to obtain significant amounts of new data and by the resources available to achieve this. Apart from supplying the missing information that has been identified for the restricted range species, sufficient evidence will also allow the design of an adequate site series for the widespread species features.

Key to resolving this issue will be the development of a cost-effective, robust and standardised (Gleed-Owen *et al* 2005; Sewell *et al* 2013) volunteer monitoring programme to obtain the information required. This will only be possible by working with NGOs – indeed this review itself could not have been produced without our former SSSI MoA work with ARC. Fortunately, amphibian and reptile monitoring is becoming increasingly popular and working in true partnership with ARC and ARG-UK in particular will enable us to harness the huge potential of citizen science and volunteer engagement.

The recommended next steps to progress the notification review for amphibians and reptiles are:

- Complete revisions to the SSSI and CSM guidelines. Final drafts of both sets of guidelines are currently being prepared and will be submitted to JNCC for external peer review in early 2016.
- Working with ARC, produce a joint costed plan for detailed site series amendments for the range restricted species features the natterjack toad, sand lizard and smooth snake (plus pool frog if added as a notifiable feature)
- Working with ARC and ARG-UK, produce a joint costed plan for the collation and analysis of existing data relevant to the notification review for the widespread amphibian and reptile species (much of this information is currently not available to Natural England)
- Working with ARC and ARG-UK, produce a joint costed plan for a long-term national volunteer monitoring programme for amphibians and reptiles, both to collect new evidence to help inform the SSSI notification review and to assist with the ongoing condition monitoring of current and future notified features. This should take other initiatives into account, e.g. the HLF Back from the Brink projects that include an element of survey within two Important Herpetofauna Areas (the Sefton Coast and Dorset Heaths)

7. Consequences and Risks

The consequences of not improving the site series for amphibians and reptiles will not be significant in the short term for the range restricted species as most populations are already included in SSSIs. However, many of the required improvements for these features are aimed at enhancing future resilience in the face of threats such as potential climate change. On the other hand, although all of the widespread species should be naturally abundant in a healthy diverse landscape, it is becoming increasingly clear that most are suffering from dramatic declines right now and that, in many cases and in many areas, their notification as SSSI features may be their best hope.

However, a major expansion of the site series for widespread species could have various risks including:

- **Political.** An increase in the number of protected sites for great crested newts will create the most potential for external objections, but including the other European Protected Species in new notifications, likely boundary changes and perceived interference with other land management activities such as forestry, will all carry risks of objections and challenge
- **Financial.** Expanding the current site series will obviously incur increased costs, especially if this expansion is ultimately substantial. Surveys to determine if populations meet SSSI selection criteria and the subsequent condition monitoring of numerous additional features will be expensive (available resources for condition monitoring of current features already falls well short of requirement), although a volunteer monitoring programme will reduce these costs considerably
- **Workload.** Although Area Teams will carry out a lot of the notification work, advisers generally don't have the capacity to organise the surveys and monitoring themselves, let alone carry them out. Realistically therefore, Natural England will require the assistance of NGO partners and voluntary groups to make a notification review of any scale or ambition a success for amphibians and reptiles

8. Implementation

The review for amphibians and reptiles is not yet at the stage where an implementation plan is possible – this should be drawn up following the revision of the SSSI guidelines (which will dictate in particular the new selection criteria and species features) and the production of costed plans and proposals aimed at obtaining the evidence required.

9. References

Arnell, A.P. & Wilkinson, J.W. 2011. Predictive modelling of key herpetofauna species in North Wales, 2011. Contract Science Report No. 976, Countryside Council for Wales, Bangor.

Baker, J., Suckling, J. & Carey, R.. 2004. Status of the adder *Vipera berus* and slow-worm *Anguis fragilis* in England. English Nature Research Report No. 546, English Nature, Peterborough

Buckley, J. & Foster, J. 2005. Re-introduction strategy for the pool frog *Rana lessonae* in England. English Nature Research Report No. 642. English Nature, Peterborough

Carrier, J & Beebee, T.J.C. 2003. Recent, substantial, and unexplained declines of common toad *Bufo bufo* in lowland England. *Biological Conservation* 111: 395-399

Dunford, R.W. & Berry, P.M. 2012. Climate change modelling of English amphibians and reptiles: report to Amphibian & Reptile Conservation and Natural England. Environmental Change Institute, University of Oxford Centre for the Environment, Oxford

- Gleed-Owen & Langham, S. 2012. The Adder Status Project – a conservation condition assessment of the adder (*Vipera berus*) in England, with recommendations for future monitoring and conservation policy. Report for Amphibian & Reptile Conservation and Natural England, CGO Ecology, Poole
- 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. English Nature Research Report No. 663, English Nature, Peterborough
- Hitchings, S.P. & Beebee, T.J.C. 1998. Loss of genetic diversity and fitness in common toad (*Bufo bufo*) populations isolated by inimical habitat. *Journal of Evolutionary Biology* 11: 269-283
- JNNC. 1989. Guidelines for the selection of biological SSSIs Part 2: Detailed guidelines for habitats and species groups. Chapter 15: reptiles and amphibians. Joint Nature Conservation Committee, Peterborough
- Langton, T.E.S., Beckett, C.L. & Dunsmore, I. 1993. UK herpetofauna: a review of British herpetofauna populations in a wider context. Report 99F2AO69 to Joint Nature Conservation Committee. Joint Nature Conservation Committee, Peterborough
- Limburn, B.W., Arnell, A.P. and Wilkinson, J.W. 2012. Important Herpetofauna Areas (IHAs) in England. Report for Natural England. ARC Research Report 12/04, Amphibian & Reptile Conservation, Bournemouth
- Matos, C. & Petrovan, S. 2012. Predicting common toad road mortality hotspots in UK's Nature Improvement Areas (NIA's) using habitat-resistance models. Unpublished report to Natural England. Froglife, Peterborough.
- Mitchell-Jones, A.J & Gent, A.H. 1997. Priority areas for mammals, reptiles and amphibians. English Nature Research Report No. 242. English Nature, Peterborough.
- Russell, L. 2012. Investigating the viability of small and isolated amphibian and reptile populations. ARC Research Report 12/03, Amphibian & Reptile Conservation, Bournemouth
- Sewell, D., Griffiths, R.A., Beebee, T.J.C., Foster, J. & Wilkinson, J.W. 2013. Survey protocols for the British herpetofauna. Amphibian & Reptile Conservation, Bournemouth; Durrell Institute of Conservation & Ecology, University of Kent, Canterbury; University of Sussex, Brighton
- Wilkinson, J.W. & Arnell, A.P. 2011. NARRS Report 2007-2009: interim results of the UK National Amphibian and Reptile Recording Scheme widespread species surveys. ARC Research Report 11/01, Amphibian & Reptile Conservation, Bournemouth
- Wilkinson, J.W. & Arnell, A.P. 2013. NARRS Report 2007-2012: Establishing the Baseline. ARC Research Report 13/01, Amphibian and Reptile Conservation, Bournemouth
- Wilkinson, J.W., Wright, D., Arnell, A. & Driver, B. 2011. Assessing population status of the great crested newt in Great Britain. Natural England Commissioned Reports No. 080. Natural England, Sheffield
- Young, S.L. & Beebee, T.J.C. 2004. An investigation of recent declines in the common toad *Bufo bufo*. English Nature Research Report No. 584, English Nature, Peterborough

Appendix 1: List of Data Sources Used to Evaluate Adequacy of Current SSSI Series for Amphibians and Reptiles

GIS Datasets (Limburn, Arnell, A.P. & Wilkinson 2012)

GIS Dataset Name	Source
England Boundary	Ordnance Survey - OpenData
Sites of Special Scientific Interest (SSSIs)	Natural England
National Character Areas (NCA)	Natural England
Higher Level Stewardship (HLS) Target Areas	Natural England
Nature Improvement Areas (NIAs)	Natural England
National Nature Reserves (NNRs)	Natural England
Local Nature reserves (LNRs)	Natural England

Species Datasets (Limburn, Arnell, A.P. & Wilkinson 2012) + ARC-NE SSSI MoAs

Species Dataset Name	Source
ARC Rare Species Database and Reptile & Amphibian Dataset - all species records from 1991 to 2011 (01/01/1991 to 31/12/2011)	Amphibian & Reptile Conservation Trust
National Amphibian and Reptile Recording Scheme (NARRS) records 2007 - 2011	Amphibian & Reptile Conservation Trust
All reptile and amphibian data from the National Biodiversity Network (NBN), not including records from above datasets	NBN Gateway
Cheshire Great Crested Newt Site Inventory	Cheshire <i>Triturus cristatus</i> Site Inventory Partnership

Number of Individual Species Records (1991 to 2011) within England Used in Analysis after “Cleaning” of Dataset (Limburn, Arnell, A.P. & Wilkinson 2012)

Species	Species Records used in Analysis of NCA and HLS Target Area Datasets (all records <1000m accuracy)	Species Records used in Analysis of SSSI, NNR and LNR Datasets (records > 100m accuracy removed)	Percentage Loss of Records Between Datasets
Range Restricted Species			
Natterjack toad	372	372	0
Sand lizard	24820	24758	0.3
Smooth snake	4220	3908	8.0
Widespread Species			
Great crested newt	1743	1289	26
Smooth newt	770	511	35.3
Palmate newt	465	301	35.3
Common frog	1427	756	47
Common toad	1453	751	48.3
Common lizard	9802	9638	4.4
Slow worm	6844	6217	9.2
Grass snake	2495	1923	22.9
Adder	4220	3907	7.4

Appendix 2: All SSSIs with Notified Amphibian and Reptile Features

SSSI Name	Date Notified	National Character Area	Notified Herp Features
01. Ambersham Common	24.10.1986	120. Wealden Greensand	Sand Lizard
02. Annaside	30.08.1989	7. West Cumbria Coastal Plain	Natterjack Toad
03. Annesley Woodhouse Quarries	22.06.2010	30. Southern Magnesian Limestone	Amphibian Assemblage
			Great Crested Newt
04. Arne	30.07.1986	135. Dorset Heaths	Sand Lizard
			Smooth Snake
05. Ash To Brookwood Heaths	19.11.1993	129. Thames Basin Heaths	Smooth Snake
06. Beeding Hill to Newtimber Hill	10.11.1986	125. South Downs	Great Crested Newt
07. Bee's Nest & Green Clay Pits	18.07.1990	52. White Peak	Great Crested Newt
08. Bewick & Beanley Moors	30.06.2010	2. Northumberland Sandstone Hills	Amphibian Assemblage
09. Bickerton Hill	13.12.1999	62. Cheshire Sandstone Ridge	Reptile Assemblage
10. Black Hill Heath	15.12.1989	134. Dorset Downs & Cranborne Chase	Smooth Snake
11. Blue Pool & Norden Heaths	01.03.1985	135. Dorset Heaths	Great Crested Newt
			Sand Lizard
			Smooth Snake
12. Bourne Valley	14.03.1995	135. Dorset Heaths	Sand Lizard
			Smooth Snake
13. Bramshott & Ludshott Commons	26.10.1984	120. Wealden Greensand	Smooth Snake
14. Brenscombe Heath	07.11.1985	135. Dorset Heaths	Sand Lizard
			Smooth Snake
15. Broxhead And Kingsley Commons	15.10.1993	120. Wealden Greensand	Sand Lizard
16. Burton Common	26.10.1984	131. New Forest	Sand Lizard
			Smooth Snake
17. Canford Heath	12.06.1985	135. Dorset Heaths	Sand Lizard
			Smooth Snake
18. Chanctonbury Hill	08.03.1985	125. South Downs	Great Crested Newt
19. Clints Quarry, Moota	03.02.1997	8. Cumbria High Fells	Great Crested Newt
20. Cockerham Marsh	16.12.1985	31. Morecambe Coast & Lune Estuary	Natterjack Toad
21. Corfe & Barrow Hills	10.03.1986	135. Dorset Heaths	Sand Lizard
			Smooth Snake
22. Cranborne Common	23.08.1985	135. Dorset Heaths	Sand Lizard
			Smooth Snake
23. Crookhill Brick Pit	25.11.2003	138. Weymouth Lowlands	Great Crested Newt
24. Denby Grange Colliery Ponds	29.09.1997	38. Nottinghamshire, Derbyshire & Yorkshire Coalfield	Amphibian Assemblage
			Great Crested Newt
25. Dew's Ponds	18.08.2000	83. South Norfolk & High Suffolk Claylands	Great Crested Newt
26. Drewton Lane Pits	28.05.1993	27. Yorkshire Wolds	Amphibian Assemblage
			Great Crested Newt
27. Drigg Coast	02.05.1986	7. West Cumbria Coastal Plain	Amphibian Assemblage
			Natterjack Toad
28. Duddon Estuary	27.02.1991	7. West Cumbria Coastal Plain	Natterjack Toad
29. Dungeness, Romney Marsh & Rye Bay	16.08.2006	123. Romney Marshes	Great Crested Newt

SSSI Name	Date Notified	National Character Area	Notified Herp Features
30. Epping Forest	05.03.1990	111. Northern Thames Basin	Amphibian Assemblage
31. Fens Pools	27.09.1989	67. Cannock Chase & Cank Wood	Amphibian Assemblage Great Crested Newt
32. Ferndown Common	21.09.1984	135. Dorset Heaths	Sand Lizard Smooth Snake
33. Fritton Common	01.10.1985	83. South Norfolk & High Suffolk Claylands	Great Crested Newt
34. Gibside	01.06.1989	16. Durham Coalfield Pennine Fringe	Amphibian Assemblage Reptile Assemblage
35. Gong Hill	01.11.1988	120. Wealden Greensand	Sand Lizard
36. Ham Common	11.11.1987	135. Dorset Heaths	Sand Lizard Smooth Snake
37. Hartland Moor	02.05.1986	135. Dorset Heaths	Sand Lizard Smooth Snake
38. Hesketh Golf Links	18.12.1989	57. Sefton Coast	Sand Lizard
39. Hockering Wood	01.09.1984	84. Mid Norfolk	Great Crested Newt
40. Holnest	03.02.2004	133. Blackmoor Vale & Vale of Wardour	Great Crested Newt
41. Holt & West Moors Heaths	10.07.1988	135. Dorset Heaths	Sand Lizard Smooth Snake
42. Holton & Sandford Heaths	26.06.1997	135. Dorset Heaths	Sand Lizard Smooth Snake
43. Horton Common	24.02.1984	135. Dorset Heaths	Sand Lizard
44. Houghton Regis Marl Lakes	01.06.1988	110. Chilterns	Great Crested Newt
45. Hurn Common	17.12.1986	135. Dorset Heaths	Sand Lizard Smooth Snake
46. Kirk Deighton	16.08.2000	30. Southern Magnesian Limestone	Great Crested Newt
47. Lions Hill	03.05.1985	135. Dorset Heaths	Sand Lizard Smooth Snake
48. Little Wittenham	16.08.2000	108. Upper Thames Clay Vales	Great Crested Newt
49. Luscombe Valley	12.03.1996	135. Dorset Heaths	Sand Lizard
50. Lyppard Grange Ponds	16.08.2000	106. Severn & Avon Vales	Great Crested Newt
51. Morden Bog & Hyde Heath	19.02.1996	135. Dorset Heaths	Sand Lizard Smooth Snake
52. New Hartley Ponds	01.01.1985	13. South East Northumberland Coastal Plain	Amphibian Assemblage Great Crested Newt
53. North Norfolk Coast	01.02.1986	77. North Norfolk Coast	Natterjack Toad
54. Oakers Bog	29.06.1988	135. Dorset Heaths	Sand Lizard Smooth Snake
55. Offham Marshes	21.03.1989	121. Low Weald	Amphibian Assemblage
56. Orton Pit	23.03.2004	88. Bedfordshire & Cambridgeshire Claylands	Great Crested Newt
57. Parley Common	24.02.1984	135. Dorset Heaths	Sand Lizard Smooth Snake
58. Peter's Pit	16.08.2000	119. North Downs	Great Crested Newt
59. Pockerley Farm Pond	01.11.1984	16. Durham Coalfield Pennine Fringe	Amphibian Assemblage
60. Poole Bay Cliffs	06.12.1989	135. Dorset Heaths	Sand Lizard
61. Poole Harbour	07.12.1990	135. Dorset Heaths	Sand Lizard
62. Poors Common	30.01.1992	131. New Forest	Smooth Snake
63. Povington & Grange Heaths	24.02.1984	135. Dorset Heaths	Sand Lizard Smooth Snake
64. Powerstock Common & Wytherston Farm	25.02.2000	139. Marshwood & Powerstock Vales	Great Crested Newt

SSSI Name	Date Notified	National Character Area	Notified Herp Features
65. Priddy Pools	21.04.1986	141. Mendip Hills	Amphibian Assemblage
66. Puttenham & Crooksbury Commons	31.07.1986	120. Wealden Greensand	Sand Lizard
			Smooth Snake
67. Red Rocks	01.11.1983	59. Wirral	Natterjack Toad
68. Rempstone Heaths	20.02.1987	135. Dorset Heaths	Sand Lizard
			Smooth Snake
69. Ripon Parks	01.02.1983	30. Southern Magnesian Limestone	Great Crested Newt
70. Rixton Clay Pits	12.12.1990	60. Mersey Valley	Great Crested Newt
71. Saltfleetby-Theddlethorpe Dunes	01.05.1988	42. Lincolnshire Coast & Marshes	Natterjack Toad
72. Salisbury Plain	29.01.1993	132. Salisbury Plain & West Wiltshire Downs	Great Crested Newt
73. Sefton Coast	16.08.2000	57. Sefton Coast	Great Crested Newt
			Natterjack Toad
			Sand Lizard
74. Silloth Dunes & Mawbray Bank	30.01.1991	6. Solway Basin	Great Crested Newt
			Natterjack Toad
75. Slop Bog & Uddens Heath	23.08.1985	135. Dorset Heaths	Sand Lizard
			Smooth Snake
76. Southampton Common	24.02.1987	128. South Hampshire Lowlands	Amphibian Assemblage
			Great Crested Newt
77. St Leonards & St Ives Heaths	03.11.1999	135. Dorset Heaths	Sand Lizard
			Smooth Snake
78. Stoborough & Creech Heaths	07.02.1986	135. Dorset Heaths	Sand Lizard
			Smooth Snake
79. Stokeford Heaths	24.03.1995	135. Dorset Heaths	Sand Lizard
			Smooth Snake
80. Stones Road Pond	20.06.1985	114. Thames Basin Lowlands	Great Crested Newt
81. Studland & Godlingston Heaths	07.10.1986	135. Dorset Heaths	Sand Lizard
			Smooth Snake
82. Subberthwaite, Blawith & Torver Low Commons	29.09.1994	19. South Cumbria Low Fells	Natterjack Toad
83. Sundon Chalk Quarry	01.05.1989	110. Chilterns	Great Crested Newt
84. Swannington Ugate Common	01.12.1985	78. Central North Norfolk	Great Crested Newt
85. Syderstone Common	10.01.1984	76. North West Norfolk	Natterjack Toad
86. The New Forest	28.02.1996	131. New Forest	Amphibian Assemblage
			Great Crested Newt
			Reptile Assemblage
			Sand Lizard
			Smooth Snake
87. Thompson Water, Carr & Common	01.10.1988	85. The Brecks	Amphibian Assemblage
			Great Crested Newt
88. Thrasher's Heath	31.03.1984	135. Dorset Heaths	Sand Lizard
			Smooth Snake
89. Thursley, Hankley & Frensham Commons	23.08.1991	120. Wealden Greensand	Sand Lizard
			Smooth Snake
90. Town Common	31.03.1994	135. Dorset Heaths	Sand Lizard
			Smooth Snake
91. Turbary & Kinson Commons	08.07.1988	135. Dorset Heaths	Sand Lizard
			Smooth Snake
92. Turners Puddle Heath	15.06.1990	135. Dorset Heaths	Sand Lizard
			Smooth Snake
93. Upper Solway Flats & Marshes	06.06.1988	6. Solway Basin	Natterjack Toad

SSSI Name	Date Notified	National Character Area	Notified Herp Features
94. Upton Heath	12.04.1990	135. Dorset Heaths	Sand Lizard
			Smooth Snake
95. Verwood Heaths	08.05.1985	135. Dorset Heaths	Sand Lizard
			Smooth Snake
96. Warmwell Heath	12.06.1987	135. Dorset Heaths	Smooth Snake
97. Wilsford & Rauceby Warrens	01.05.1986	47. Southern Lincolnshire Edge	Great Crested Newt
98. Winfrith Heath	05.12.1996	135. Dorset Heaths	Sand Lizard
			Smooth Snake
99. Winterton-Horsey Dunes	01.03.1989	80. The Broads	Natterjack Toad
100. Woolbeding & Pound Commons	22.09.1998	120. Wealden Greensand	Reptile Assemblage
101. Woolmer Forest	28.06.1994	120. Wealden Greensand	Natterjack Toad
			Reptile Assemblage
			Sand Lizard
			Smooth Snake
102. Worgret Heath	18.11.1987	135. Dorset Heaths	Sand Lizard
103. Wyre Forest	08.04.1998	66. Mid Severn Sandstone Plateau	Reptile Assemblage
104. Yardley Chase	26.07.1984	91. Yardley Whittlewood Ridge	Great Crested Newt