# Establishing Favourable Reference Values – example for Great Crested Newt (*Triturus cristatus*) in England

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## 1. Introduction

The revised guidelines for setting favourable reference values (FVRs) (DG Environment 2017) distinguishes between two approaches: a model based approach and a reference based approach. This paper exemplifies a reference based approach for setting FRVs for great crested newts in England.

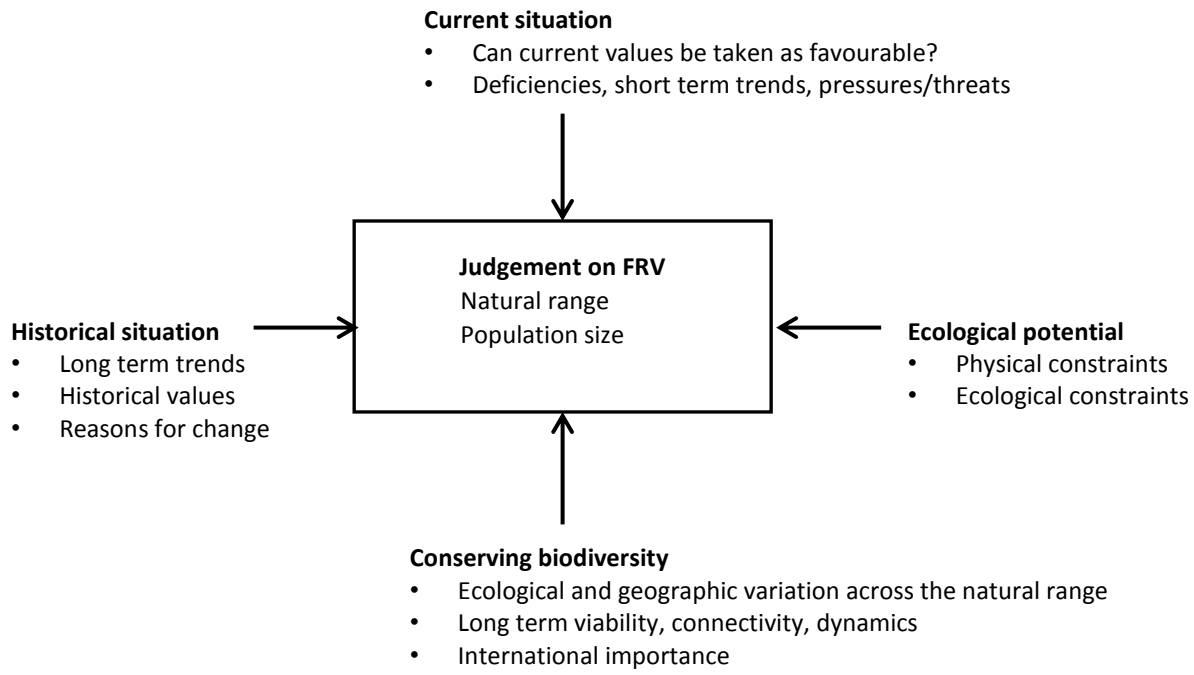
This example has been developed as part of a pilot project to better define Favourable Conservation Status by Natural England with input from other conservation agencies and NGOs. Natural England's pilot project explores methodologies for defining Favourable Conservation Status (FCS) for a range of habitats and species, and has not been evaluated. No decision has been taken as to the preferred method and as such this example should be seen in the context of testing methodologies, and is not aimed at having legal effect. However, a series of exercises looking specifically at great crested newts in the context of developing regional plans and assessing a strategic approach to derogating protection of this species in relation to spatial development are offering an opportunity for exploring the development of FRVs in an applied context. It is recognised that ideas will develop and over time the way terminology is used may be adapted in different ways for different species and for different circumstances. We report on a process that has been valuable in providing an objective basis for developing FRVs for this and for other species.

## 2. Methodology

### *2.1 Considerations*

Article 17 reporting guidelines provide a number of factors that should be considered when setting FRVs (DG Environment 2017). The guidelines make clear that each of these factors alone do not automatically determine the FRVs, but together should inform a judgement on what constitutes a favourable conservation status[1]. Below, these factors have been grouped into 4 types of considerations to take into account when defining FVRs: Current situation, Historical situation, Ecological potential and Biodiversity conservation.

[1] Article 17 guidelines: "*FRVs do not automatically correspond to a given 'historical maximum' or a specific historical date; historical information (e.g. a past stable situation before changes occurred due to reversible pressures) should however inform judgements on FRVs. FRVs do not automatically correspond to the 'potential value' which however should be used to understand restoration possibilities and constraints*".




*2.2 Historical loss approach*

Applying the guidance for setting FRVs presents the challenge to translate important generic conservation principles to the specific situation of a particular species. Often there is a lack of evidence (in terms of genetics, viability, ecological requirements, connectivity, etc.) about what long term distribution and abundance is associated to a species that is maintaining itself as a viable component of its natural habitats in its natural range. This challenge is not only related to the significant demands on ecological data and evidence, but also to the need to reconcile different considerations and perspectives into a coherent conclusion on the FRV, see figure 1.

To help guide FRV judgement in cases where a pragmatic decision is needed and to promote a degree of consistency between species in different circumstances, the four types of considerations have been transposed here into a framework to determine FRVs based on restoring a 'proportion of historical loss'[2], where:

$$FRV = C+\%(H-C)$$

- 'Historical loss' means the difference between the current situation (C) and a previous historical maximum (H). 'H' is usually considered at a point before 'significant (negative) changes' have taken place or where good data exist. This difference can be big (in case of major declines) or small or even zero (when the current value is equal to the historic value). We advocate that this approach is most useful where historic declines are known or suspected.
- The historical maximum can't automatically be taken to represent the FRV: historical levels may be artificially inflated, may be ecologically incompatible with FCS for other species (different features may have reached maxima at different times in history), or may in other ways represent a situation that is more than needed for biodiversity conservation. However, a clear framework is needed for providing an objective and transparent basis for making such assessments.

[2] See also Bijlsma et.al 2014 for a similar approach to FRVS for habitat types

- Existing guidance sets a policy framework that determines that favourable levels cannot be in prnciple lower than those values that were present when the Directives came into effect (DG Environment 2017); this was 1994 in England. Restoration to 1994 levels is therefore required to comply with this policy.
- The methodology therefore establishes a proportion (%) of historical loss that occurred prior to the Directives coming in to effect to be restored, which is informed by the other 3 types of considerations:
    - Current situation: restore a bigger proportion if the current situation shows more deficiencies. E.g. Restore more of historical loss if a species is endangered, compared to when a species is still widespread and abundant.
    - Ecological potential: restore a bigger proportion if there is more potential compared to when historical losses are largely irreversible[3].
    - Conserving biodiversity: restore a bigger proportion if the imperative for biodiversity conservation is bigger.
- Using a 'proportion of historical loss' to define a restoration target enables the application of a similar standard to different situations: restoring 25% of a small historical loss means a small increase, whereas 25% of a major historical decline means a much bigger increase.

To arrive at judgements for FRVs in a pragmatic way, the three considerations (current situation, ecological potential, imperative for biodiversity conservation) can each be classed as A, B or C through expert judgement using guidance section 2.3. An indicative proportional restoration of the historic loss can subsequently be derived from the Table 1 below. This table simply reflects a step-wise increase from 0-100% to indicate a higher proportion if there are more reasons for a bigger increase (from AAA to CCC). Bigger steps towards the lower right hand corner are related to the bigger uncertainty we have about what exactly is FCS, the further we are currently removed from it.

| | | **Conservation biodiversity** | | |
|---|---|---|---|---|
| **Current situation** | **Ecological Potential** | **A** | **B** | **C** |
| **A** | **A** | 0-5% | 5% | 10% |
| | **B** | 5% | 10% | 15% |
| | **C** | 10% | 15% | 20% |
| **B** | **A** | 15% | 20% | 25% |
| | **B** | 20% | 25% | 30% |
| | **C** | 25% | 30% | 40% |
| **C** | **A** | 30% | 40% | 50% |
| | **B** | 40% | 50% | 75% |
| | **C** | 50% | 75% | 90-100% (or >100%) |

Table 1. Setting a target for the proportion of historic loss to be restored

*2.3 Guidance for classifying the considerations*

The three classes A, B and C for each consideration only provide a very basic ordering, for the purpose of deriving an indicative order of magnitude for FRVs in a practical and consistent way. They are not meant to precisely delineate each situation a species could be in. The method would only

[3] To account for the principle that FRVs should be set on the basis of ecological/biological considerations, 'irreversibility' is interpreted in a technical sense, not including budgets or social-economic considerations.

need a judgement on which class a species would belong to 'more' than the other classes. As such, the framework is only used when other evidence fails to provide a clear determination of FRVs.

| **Factor** | **A.** | **B** | **C** |
|---|---|---|---|
| **Current status** | Populations widespread and largely sufficient | Some populations unsustainable | Populations scarce and mostly unsustainable |
| **Ecological potential** | Minimal potential. Most historical loss irreversible | Moderate potential, some historical loss irreversible | Good potential, most historical loss reversible |
| **Biodiversity conservation** | Low imperative; | Moderate imperative; | High imperative |

Table 2. Classifications and descriptors

The following indicators can be used to judge which class would best describe the species:

Current status

A. Populations widespread and largely sufficient, e.g.
- Conservation status clearly favourable
- IUCN status least concern

B. Some populations unsustainable, e.g.
- Conservation status classed as inadequate
- IUCN status Near threatened.

C. Populations scarce and mostly unsustainable. e.g.
- Conservation status classed as bad
- IUCN status threatened

Ecological potential

Note that historical references below are considered in the context of judging what's plausible in the future, rather than an attempt to delineate a historical situation that should be preserved.

A. Minimal potential; most historical loss irreversible, e.g.
- Significant permanent constraints of technical nature
- Significant change in distant past (e.g. before World War II, pre-industrialisation, pre-agricultural improvement)

B. Moderate potential, some historical loss reversible
- Limited or temporary technical constraints to restoration
- Significant changes in contemporary timescales (e.g. decades after World War II period, agricultural intensification, urbanisation)

C. Good potential, most historical loss reversible, e.g.
- No technical constraints to restoration
- Significant change relatively recent (e.g. last 3 decades)

Biodiversity conservation

A. Low imperative
- No significant international importance

- Minimal improvements needed for biodiversity conservation (viability, ecological functioning, representation across the natural range)

B. Moderate imperative
- High international importance;
- Substantial improvements needed for biodiversity conservation (viability, ecological functioning, representation across the natural range)

C. High imperative
- Very high international importance
- Significant improvements needed for biodiversity conservation (viability, ecological functioning, representation across the natural range)

We advocate that this approach is applied separately to each for the conservation status parameters in turn to provide FRVs.

## 3. Example application to FRP for great crested newt in England

### *3.1 Great crested newts in England*

Great crested newt populations have declined significantly in England in the last century, mainly as a result of pond loss through changing agricultural practices and urbanisation. There is evidence of an estimated 50% loss of populations in the 1960s alone (Beebee 1975) There have been continuing losses since that period, estimated nationally to be around 2% every 5 years (Nicholson & Oldham 1986). While, since the 1990s, the rate of pond losses have slowed, and indeed there may have started to be an increase in pond numbers (Williams et al 2010), it is assumed that there has been a continued decline in great crested newt habitats and hence numbers of occupied ponds of the species. Despite these losses, this species remains widely distributed in England and is still well represented throughout its natural range, albeit in much reduced abundance. While there seem to be no ecological restrictions to a significant restoration of former population levels (the creation of suitable ponds and terrestrial habitat creation is technically straightforward), the species is not at risk of extinction in England and restoration to the population levels that existed in the mid-20th century is not judged to be imperative for biodiversity conservation purposes. Nevertheless, with a large share of the international population, England has a significant responsibility for the conservation of this species. While it is likely that anthropogenic changes in newt status will have become increasingly significant during the first half of the 20th Century, there is sufficient evidence to model species declines since the mid-1960s. For this reason, we have selected 1965 as the baseline year for assessing restoration potential.

### *3.1 Judgement on restoring historical loss*

Using the methodology described above the restoration target for the great crested newt is judged as follows:

- *Current Status: A.* The species is widespread and not threatened with extinction. IUCN status: least concern.
- *Potential: C.* There is good potential for restoration. Pond creation/ restoration is technically feasible and a well-established practice. Most of the historical loss is technically restorable.
- *Biodiversity conservation: B*. A high proportion of the international population occurs in England. Although the species is widespread, some populations are small and fragmented. Some improvements may be needed locally to achieve sustainable populations throughout the natural range.

- *Conclusion: ACB → FRV indicated at restoring 15% of historical loss prior to 1994* (i.e. with reference back to estimated 1965 levels). This corresponds to an approximate 20% increase compared to current population levels

*3.2 Translation to FRV for population*

Great crested newt populations undergo significant natural fluctuations over prolonged periods. The sustainability of populations is better indicated by the presence of high quality breeding ponds and terrestrial habitat. There is a strong correlation between high Habitat Suitability Index scores (>0.7) for ponds and the importance of individual ponds for breeding. Therefore, the population 'unit' used for FRV is not set in terms of numbers of individuals, but in terms of the number of high quality ponds (HSI > 0.7) in habitat occupied by great crested newts.

As great crested newts in England do not exist as a single biological population, a meaningful favourable population size at England level can only be established as a bottom up aggregation of all local favourable populations. While there are some locally based estimates of changes in pond numbers, which allow some assessment of previous pond occupancies (e.g. 55% pond loss between 1870-1989 in Essex, (Heath, D.J. and Whitehead, 1992); 60% pond loss between 1880-1995 in Cheshire (Boothby, 1997)), in the absence of comprehensive coverage of such data and noting the considerable effort that would be needed to undertake this work across England, the favourable population for England is defined using this methodology as the number of appropriately managed, high quality breeding ponds corresponding to a restoration of 15% of historic loss (against a 1965 baseline date), equating to approximately 20% above the current number. The most recent estimate of 13,780 ponds with an HSI score >0.7 allows a **provisional FRV** to be set at approximately **16,500 high quality breeding ponds**.

The EU recommended habitat unit for article 17 reporting on great crested newt is occupied km squares. Field data are insufficient to provide a direct measure of 1 km square occupancy and modelling methods have been trialled. Using such an approach, the number of 1 km squares occupied by great crested newts in England has been estimated at 16,812 (13,760 – 20,868) (Wilkinson et al., 2011). Using the same approach as above, a **provisional FRV** using EU units can be set 20% above 16,812 at **20,174 occupied squares.**

## 4. Discussion

As the concept of favourable conservation status is a human construct rather than a natural phenomenon that can be empirically proven, favourable reference values can't be determined using a purely scientific method. Reliance on scientific approaches alone, such as the calculation of minimum viable population sizes, provides an incomplete basis for understanding the biological significance of a species as a characteristic component of the landscapes in any geographic area and also does not consider the significance of socio-economic interest or anthropogenic impacts on the species. This is especially true of species that would naturally be widely distributed. Instead, FRVs have to be established using judgements of scientific data. The historical loss approach outlined above and exemplified for great crested newt populations provides a way to bring together different considerations to make these judgements in a structured way. It can provide a degree of consistency for systematic use of expert judgement. The approach may be suitable where sufficient data is available to estimate historical changes, but detailed evidence on viable populations or factors to scale up from MVPs to FRPs are not available. As such it presents an example of a reference based approach suggested in the Article 17 guidelines.

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