THE GREAT CRESTED NEWT: an ongoing conservation dilemma

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Male Great Crested Newt with prominent crest.
Richard Revels

Great Crested Newts declined substantially in Britain as a result of post-war agricultural intensification and were granted legal protection in 1981. Because they remain widespread, however, conflict between development and conservation has continued and an effective strategy for securing the long-term future of this species remains elusive.

Animal Magic

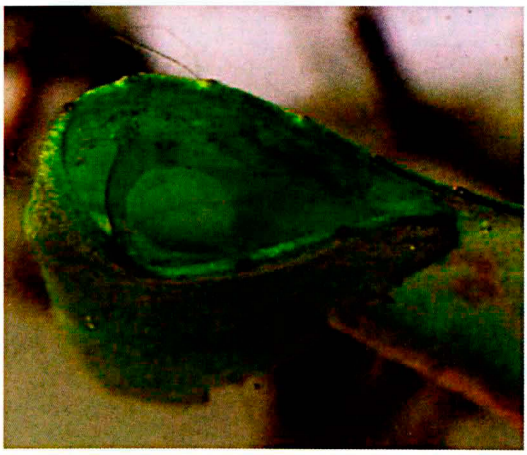
It was one of those unforgettable childhood days. As I stared wide-eyed into the shallow water of a field drain, there it was, dark and motionless, the outline of my first ever and long-sought-after Great Crested Newt *Triturus cristatus*. And what a magnificent animal this is, up to 16cm long and dwarfing both of our other newt species (the Smooth Newt *Lissotriton vulgaris* and the Palmate Newt *L. helveticus*), the males sporting an impressive denticulated crest on the back and tail, and both sexes flaunting a gaudy belly pattern of black spots on a bright orange-yellow backdrop. Who could fail to be impressed?

But this animal is enigmatic as well as charismatic. For what purpose is the extravagant belly artwork designed? Surely these must be warning colours, because crested newts possess a chemical defence in warts that cover their body and give them their alternative, unprepossessing name of 'warty newt'. These chemicals are certainly nasty. An enterprising Victorian naturalist, one Miss Ormerod, gave a first-hand account of crested-newt toxins by gently pressing a live animal between her teeth and describing the ensuing symptoms, which included foaming at the mouth, headaches, general discomfort and shivering fits. But the enigma is this: flat on the ground, belly colours are invisible to predators on land, where the newts spend most of their lives and emerge only under cover of darkness. In the breeding season the newts become aquatic, but they avoid ponds with fish because, paradoxically, their larvae

do not have toxins and are highly vulnerable to fish predation. On top of that, crested newts are readily consumed by herons, and even kingfishers have been seen to take them, all presumably unimpressed by their chemical arsenal. The question therefore remains as to what the vivid colour patterns defend against. Irrespective of the belly colour's significance for newts, however, it is hugely useful to people studying them. Every pattern is unique, allowing the reliable identification of individuals and thus investigations of movement and survival. Adults typically range up to 500m from breeding ponds and can live for up to 17 years, but more usually reach just seven or eight.

Another enigma is even more incomprehensible. Invariably, half of all Great Crested Newt eggs die early during embryonic development because of a bizarre chromosome system. Only those animals heterozygous at chromosome 1 can survive; homozygotes of either type (always totalling 50% of the progeny of heterozygous adults) inevitably perish. How this horrendous genetic load evolved remains unknown; the system is shared with the other crested and marbled newt species (there are several, in addition to the 'northern' Great Crested Newt found in Britain), but not with any others. It seems astonishing that this built-in 50% mortality, in addition to factors such as predation and pond desiccation, has allowed this animal to survive at all, let alone to become one of Europe's most widespread amphibians.

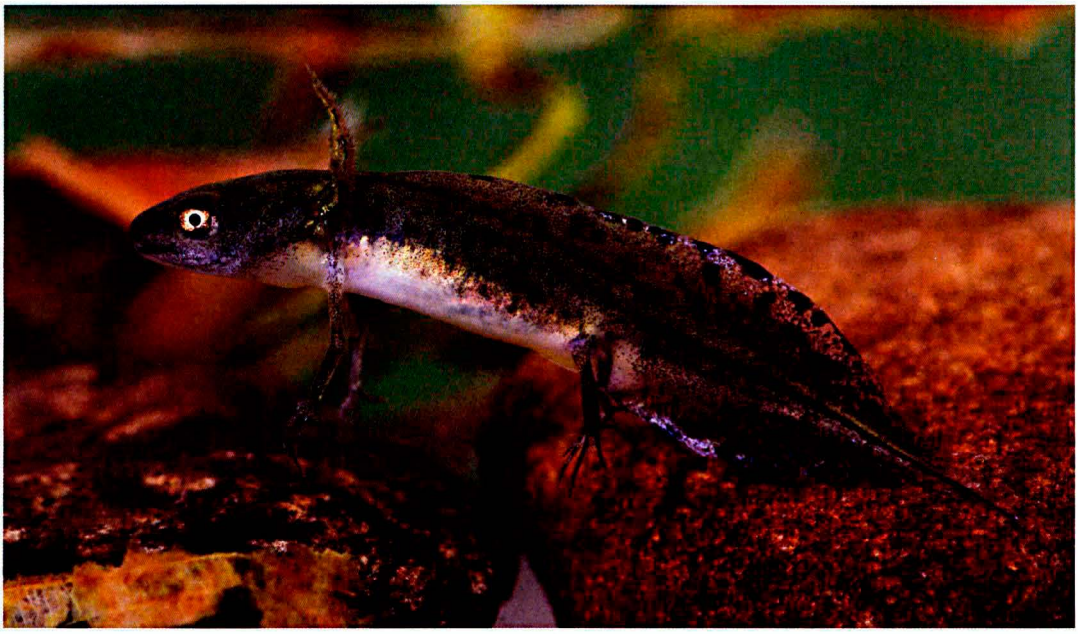
In other respects, Great Crested Newts have similar behaviours and life histories to those of the smaller species (Jehle *et al.* 2011), resorting to breeding ponds in spring while spending the rest of the year on land, where they also hibernate. Adults prey on a range of invertebrates, including worms, snails, leeches and insect larvae. Males defend areas within ponds in a crude lekking system whereby they court females with extraordinary displays of body-arching, tail-whipping and tail-fanning. A spermatophore is deposited and then taken up by the female, followed by internal fertilisation and the laying of a few hundred eggs wrapped individually in the leaves of pondweeds. One can often see the results of this activity, distinctively curled leaves, just by walking around a pond margin. After hatching, the predatory larvae grow through the summer and metamorphose almost as large as an adult Palmate or Smooth Newt. Overwintering as larvae is much rarer in Great Crested Newts than in the other species. Adult newts usually leave the water by midsummer, but some may linger longer. Smith (1951) recalled a population living in a concrete pond in the grounds of Blenheim Palace where the newts remained all year round, and could be watched moving under winter ice. Are they still there, I wonder?



Pondweed leaf bent around newt egg. Howard Inns

Why are crested newts strictly protected?

The Great Crested Newt is not a rare species; far from it. With a global distribution ranging from Britain and France through northern Europe and as far east as central Asia, it is one of the most widespread tailed amphibians in the world. The Great Crested Newt is listed as a species of Least Concern by the IUCN, which is unsurprising when one considers its wide distribution, with tens of thousands of breeding ponds. Why, then, did it receive the highest possible level of protection in Britain under Schedule 5 of the Wildlife & Countryside Act of 1981? The crested newt was placed on Appendix II of the Bern Convention, a Council of Europe assembly, in 1979. This listing indicates high conservation priority, which for crested newts was based on reports of declines in a few west European countries. There was no evidence about to indicate poor overall status and no data at all from more than 80% of the species' global range. The UK government nevertheless ratified the recommendations of the Convention in the 1981 Act, giving, it seems, little thought to how such a widespread species could be conserved



Great Crested Newt larva in dew pond, Peak District. Paul Hobson/FLPA

commensurate with its highly protected status. But there was a case to answer. During the 1960s, about 50% of British Great Crested Newt ponds were lost (Beebee 1975), including one near the field drain where I first saw this beautiful creature. Subsequent research has shown that declines continued, albeit at a slower pace, in subsequent decades and are still continuing today. Crested newts are also rarer and declining faster than the other widespread amphibian species, notably the Smooth and Palmate Newts, Common Frogs *Rana temporaria* and Common Toads *Bufo bufo*. The percentage of countryside ponds occupied by crested newts, averaging around 12%, is the lowest for any of this species group (Wilkinson & Arnell 2013).

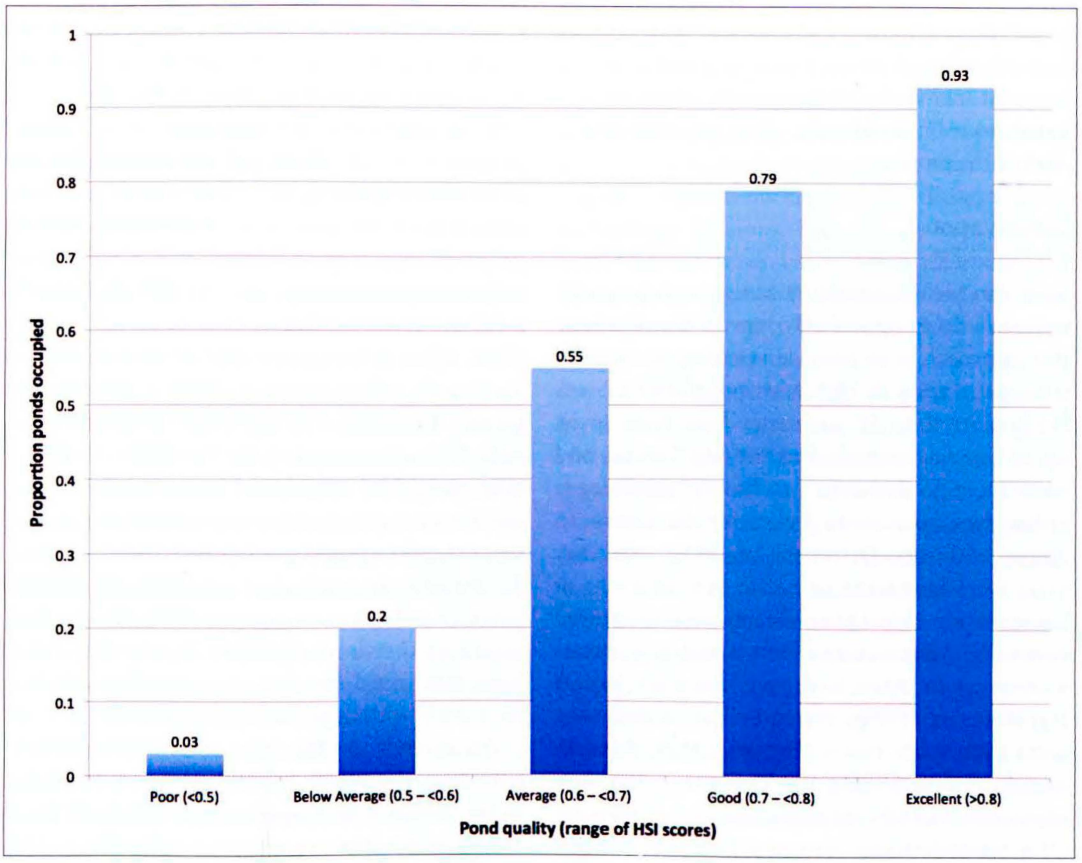
What, then, is the particular problem for this newt? Amphibians are particularly sensitive to environmental change because they require two types of high-quality habitat in close proximity to each other. Deciduous woodland, pasture, hedgerows, scrub and rank grassland are among the best terrestrial habitats because they provide good cover and foraging opportunities in summer and good hibernation sites in winter. In contrast, huge, intensively farmed arable fields are the least hospitable. These terrestrial habitat requirements, however, are common to all the widespread amphibians. It is more likely that the second habitat, suitable freshwater ponds for breeding, is the key factor specific to crested newts. Very small or shallow ponds, usable by frogs, and by Smooth and Palmate Newts, are inadequate for them. Large ponds usually contain fish and, while these can be good sites for toads, they are consequently of no use to the Great Crested Newt. This animal depends on ponds ideally in a 'goldilocks zone' of intermediate size, mostly unshaded, free of fish, and with a rich macrophyte flora but also extensive areas of open water. Such ponds were once found in field corners all over Britain, but many have disappeared owing to neglect, drainage, deliberate infilling, eutrophication from fertilisers, and the introduction of fish for angling or just to get rid of unwanted pets. Other good crested-newt ponds crop up in old quarries, abandoned sandpits and the like, some of which support large populations but which are relatively rare landscape features. Habitat loss has undoubtedly been the main problem for Great Crested Newts, but there are other specific concerns. An increasing frequency of mild, wet winters is correlated with low survival of Great Crested Newts, perhaps indicating a deleterious effect of climate change (Griffiths *et al.* 2010). Most worryingly, a new strain of pathogenic chytrid fungus that wipes out Fire Salamanders *Salamandra salamandra* and can attack Great Crested Newts has recently emerged on the near Continent. We can only hope that it does not cross the Channel.

Distribution and status

Given the evidence of declines, an obvious imperative was to quantify the status of Great Crested Newts in the British Isles. Overall distribution was well known by the 1970s: the species is most common in the English lowlands, rare or absent in upland areas of Scotland, Wales and south-west England, and entirely absent from Ireland. But what of the detail? How many good breeding ponds with associated terrestrial habitat still exist, and where are they? Survey methods for crested newts are effective but time-consuming. A combination of dip-netting, egg-searching, live-trapping, and night-searching ponds with a powerful torch will reveal the presence of Great Crested Newts, but up to four surveys spread over a season are required in order to demonstrate with high confidence that the species is *not* present (Sewell *et al.* 2010).

Implementing this approach across thousands of prospective breeding sites is a formidable logistic challenge. The first attempt to address status was therefore based on a questionnaire survey that provided data from 11,000 wetlands. The results were then extrapolated across the UK to infer a national total of around 18,000 surviving crested newt breeding sites (Swan & Oldham 1993). Subsequent refinements started with the derivation of a Habitat Suitability Index (HSI), based on ten semi-quantitative criteria, including both aquatic and terrestrial habitat features, that can be assessed to judge whether crested newts are likely to be present (Oldham *et al.* 2000). One HSI criterion is the presence of neighbouring ponds, reflecting the realisation that metapopulation structures involving multiple ponds are especially important for crested newts (Griffiths *et al.* 2010). This approach has proved valuable; there is usually a high correlation between HSI 'score' (which ranges from 0 to 1) and occurrence of Great Crested Newts (Fig. 1). Most recently, the Ordnance Survey database of British ponds along with estimations of crested-newt

Figure 1 HSI scores and crested-newt pond occupancy in south-east England.



occupancy rates, HSI data and GIS-based habitat-modelling were combined to generate a more finessed estimate of crested-newt pond numbers in the UK (Wilkinson *et al.* 2011). A distinction was made between 'occupancy', all sites where crested newts could be found (perhaps 61,000), and those with HSI scores of more than 0.6, where successful breeding was likely (about 28,000).

Considerable uncertainty, however, surrounds these numbers. In Suffolk the national database substantially exaggerated pond numbers, implying perhaps 30% fewer crested-newt ponds than expected (Langton 2012), whereas other research inferred that, overall, the pond database is biased towards underestimates (Biggs *et al.* 2014). All that we can safely conclude is that the numbers of good-quality crested-newt ponds are probably in the low tens of thousands, but the recent studies also indicate regional differences in the distribution of these ponds which often correlate with regions of high pond density (Fig. 2). Unfortunately, a central problem remains unresolved. We may know roughly how many good crested-newt ponds still exist and where they are most likely to occur, but we still do not know the specific locations of more than 10–20% of them. Those mapped in Fig. 2 represent merely the closest ponds within 1km of actual crested-newt records, which generally do not identify the pond.

Conservation

How can we effectively conserve a widespread animal with an imperfectly known distribution? One approach is to provide statutory protection at least to sites with high newt populations. Since 1981, more than 50 such sites have been given Site of Special Scientific Interest (SSSI) status and many more SSSIs happen to have crested newts within their boundaries. Following the European Union Habitats Directive of 1992, member states were instructed to create Special Areas of Conservation (SACs) for species such as crested newts. The conservation dilemma with this species is common to many European countries, where it remains relatively common but is declining faster than other newts (Denoel 2012). Britain's record in implementing this directive is less than impressive. The UK currently has 32 crested-newt SACs, fewer than any other west European country except Luxembourg. France has just under 200 and Germany more than 700 SACs for crested newts (Edgar & Bird 2006). Probably less than 1% of crested-newt sites in Britain have any form of statutory protection (Jehle *et al.* 2011).

Sadly, controversy and confrontation have dogged crested-newt conservation for more than three decades. Because the Great Crested Newt is so widespread, the regularity with which it crops up in sites with planning applications has generated a huge bureaucratic and financial burden both for developers and for the statutory conservation bodies. Mitigation has become the primary response to threats, this usually involving the catching and transfer of newts from a prospective development area to another 'suitable' habitat, if necessary created at the developer's expense. There have been prosecutions for breaches of the 1981 Act, but successful resistance to development for this highly protected animal has been rare. Surveys and mitigation are usually carried out by expert consultants, the main beneficiaries of the process, which can be very lucrative. Media attention has become increasingly unsympathetic to newt conservation because of these costs; a newspaper headline in 2013 ('Council's £210,000 bill to move 18 newts') reflects all-too-typical coverage.

These operations are authorised by a licensing procedure run, at considerable expense, by the statutory conservation agencies. Even people surveying crested newts for general interest or conservation purposes require these licences, which are granted only after proof of experience is provided. This is a far cry from childhood days of earlier generations, when it was acceptable to dip-net a pond and catch a few newts without a government permit. Ironically, a recent study revealed that in only 12 instances out of the hundreds of mitigation operations sanctioned by government have the licence requirements to monitor the success of newt translocations been fulfilled. Eleven of these 12 mitigations resulted in extinction or reduced newt populations compared with the original locations (Lewis *et al.* 2014). No developer has been sanctioned, let alone prosecuted, for failure to comply with these licence conditions.

An attempt to rationalise crested-newt conservation in the wider countryside was instigated in the 1990s with a Species Action Plan (SAP), a favourite government initiative at that time. This

went through various phases of development and was later accompanied by a pan-European SAP (Edgar & Bird 2006). Although full of admirable aspirations, these SAPs have had very limited effect because they have never been effectively implemented. All the SAPs recommend creation or restoration of hundreds, or even thousands, of high-quality breeding ponds, but there is no mechanism to deliver this crucial objective. With no strategic directive about where they should go and how they would be recorded, let alone supportive funding, the SAPs have relied on uncoordinated efforts by miscellaneous organisations and landowners around the country. There have been successes, particularly since the emergence of agri-environment schemes whereby landowners can obtain funds for species-conservation work, but we do not know whether these efforts have significantly influenced the continuing decline of crested-newt habitats.

Discontent with the failure to implement a workable strategy for crested-newt conservation led to a formal complaint to the European Union (Langton 2009). The complaint was upheld, prompting the UK government to formulate a response which has only begun to take shape. Whether this renewed engagement, now including a 'Great Crested Newt task force', will have tangible consequences on the ground remains to be seen.

Future prospects

The ambivalent attitude of government to Great Crested Newt conservation, signing up to good intentions but failing to follow through when the scale of need became clear, has dogged the issue for decades. Legal protection of crested newts provided an ideal opportunity to implement wide-ranging conservation of high-quality ponds, a valuable and much-diminished wildlife resource. Rather than being seen as a burden, the relative abundance of Great Crested Newts could have provided a sound basis for a national pond-restoration programme. This has not happened to a substantial extent, despite promising initiatives such as the 'Million Ponds Project'.

Will the future be brighter? We have certainly learnt how to create and manage ponds and their environs to the benefit of Great Crested Newts and other incumbent wildlife (Baker *et al.* 2011). We also know that landscape-level action, maintaining metapopulations with multiple ponds within good-quality terrestrial habitat, is essential for long-term survival. Nevertheless, we still need to determine where most crested-newt ponds actually are.

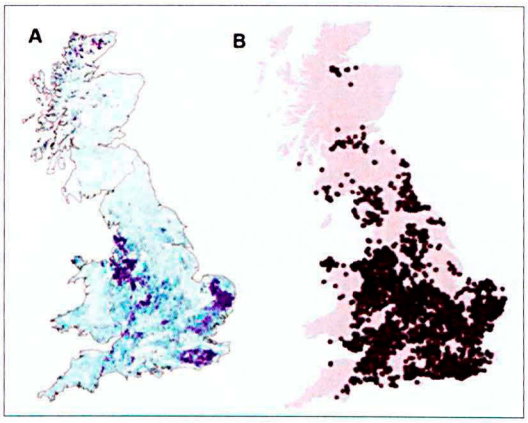


Figure 2 A, UK pond density distribution; B, Great Crested Newt pond distribution.

Despite the difficulties of scale, we must surely return to this problem and may now have a better chance of achieving that goal. The presence of crested newts in a pond can be reliably determined on the basis of a single environmental DNA (eDNA) sample (Biggs *et al.* 2014). This procedure is expensive and not yet relatable to newt numbers, but these limitations are likely to decrease as the technology develops. Increasingly sophisticated modelling has shown where survey effort can most efficiently be targeted. Sampling methods for determining trends in crested-newt numbers over time, crucial information thus far lacking, have also been derived. The most statistically robust approach will involve regularly surveying around 2,000 ponds within the species' range, an ambitious target requiring a big increase in survey effort. And for all of this we need a regularly updated national database of high-quality crested-newt ponds, ideally with their associated HSI scores.

Notwithstanding these advances, the critical issues of funding and implementing nation-scale habitat management for crested newts remain unresolved. A good start would be to quadruple, at least, the number of crested-newt SACs in the UK, making our protection level less embarrassing compared with those in other countries of similar size. Another helpful move would be to defend at

Male Great Crested Newt showing belly markings.
Chris Dresh

least those crested-newt ponds (and their environs) with HSI scores of more than 0.7, rather than automatically sacrificing them to pointless mitigation efforts. Environmental stewardship schemes remain a good option for pond management, and their future support by government will be pivotal. Our underfunded and increasingly squeezed statutory conservation agencies are unlikely to help much with any other funding streams. Radical changes could help. 'Green tape' of the licensing burden could be reduced by invoking them only where significantly damaging operations are proposed. Otherwise let people catch newts at will, and thus unfetter a harmless activity from pointless bureaucracy. And why not abandon the expensive farce of mitigation procedures that mostly fail, anyway? Instead, where planning permission is granted, put on developers a requirement to improve the status of existing crested-newt sites by restoring or creating ponds where they will do some good. This would probably be cheaper than conventional mitigation and would transfer a substantial part of the cost of crested-newt conservation to the private sector. None of this, however, amounts to an organised strategy, identifying priorities and instigating conservation management across the UK. Thirty years on, we still lack an effective policy for conserving Great Crested Newts and the marvellous, high-quality ponds that have for long been wildlife treasures in the British countryside. For now, the conservation dilemma remains.

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