The use of environmental DNA, or ‘eDNA’ as a means to detect whether a species is present in an environment has gained momentum over the last few years. This approach can reduce the amount of costly, time consuming and intrusive survey effort required on development projects, including those which are subject to an Environmental Impact Assessment (EIA).

Great crested newt *Triturus cristatus* (GCN) is one species which can lead to delays in the planning process where sufficient survey data is not available to inform the baseline assessment at a site. Historically, Natural England stipulated that four surveys were required to detect GCN presence or absence in waterbodies, each of which required a late evening and early morning visit. These ‘traditional’ GCN presence/absence surveys must be undertaken between mid-March and mid-June with at least two visits in the core period of mid-April to mid-May. A combination of three survey techniques is employed on each visit, usually including bottle trapping, torch surveys and egg searches, with hand netting or terrestrial searches sometimes used where primary techniques are not possible. This kind of survey is labour intensive and results in disturbance to the waterbody and its aquatic life.

More recently a test became available which can determine whether a target species is present in the waterbody simply by analysing a water sample. On 28th March 2014, DEFRA published a report into the effectiveness of DNA testing to detect GCN presence from samples of water¹.

The test was proved to be more accurate than standard survey methods at detecting GCN presence and following on from the report Natural England confirmed that they would accept eDNA sampling as proof of presence or absence of GCN in a waterbody.

GCN eDNA survey requires only one daytime visit which can be undertaken any time between the 15th April and the 30th June each year. This potentially avoids the requirement for the standard four nocturnal surveys and as such can reduce costs and help to meet tight planning deadlines. It also reduces disturbance to the waterbody as surveyors do not enter the water, and does not require that the animals are captured, as is the case with bottle trapping.

So, if eDNA survey is more accurate, more cost effective, better for GCN, and better for surveyors (because it doesn’t require night working!), why not always use it on projects where GCN surveys are required?

Firstly, eDNA surveys can only determine if the species is present or not; it does not provide any information on population size. The baseline assessment of an EIA usually requires data on the GCN population size class which could be affected by the development. Therefore, if eDNA surveys find that there are GCN present in a waterbody, six traditional survey visits would be required to determine population size, being undertaken between mid-March and mid-June, with three visits in the core period of mid-April to mid-May (ideally at least a week apart).
Secondly, unlike traditional GCN survey techniques, GCN eDNA surveys provide no information on whether other amphibian species are present on site. Common toad *Bufo* is a priority species under Section 41 of the NERC Act 2006 and if information on the status of common toad on the site is required, additional surveys would need to be carried out.

If a project ultimately requires information on GCN population size, which can only be determined by undertaking six traditional survey visits, there may not be merit in doing an eDNA survey. However, eDNA survey can be useful to reduce the number of waterbodies which require population estimate surveys, with these surveys only being carried out on waterbodies which return a positive eDNA result. Due to the slightly different survey periods for eDNA and traditional GCN surveys, this approach usually means that one or two traditional survey visits will need to be undertaken alongside an eDNA survey. This allows sufficient time for six population survey visits to be undertaken within the appropriate survey period (considering potential delays to the survey programme such as adverse weather conditions) if eDNA results come back positive from the laboratory. Desk study information can also help determine survey approach, with the presence of existing records for GCN on or near a site indicating that population surveys are likely to be required and that eDNA surveys may not be a suitable option.

The value of GCN eDNA surveys in EIA projects becomes apparent either where population size class data is not required, which may be the case if the project is at an early stage, or where it is too late in the season to start traditional surveys, but knowing whether GCN are likely to be present on site would help guide the next steps for a project.

In some cases, eDNA surveys can rule out GCN in all waterbodies on and within influencing distance of the site and the project can then proceed without needing to consider potential impacts and mitigation for this species.

Calculating whether GCN eDNA analysis will be cost-effective for an EIA project depends on a range of factors and sometimes requires a complex cost-benefit analysis. It is therefore important for the ecological consultant to work closely with the project team to understand the required outcomes and potential risks specific to the project, as well as the particular challenges posed by the site.

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