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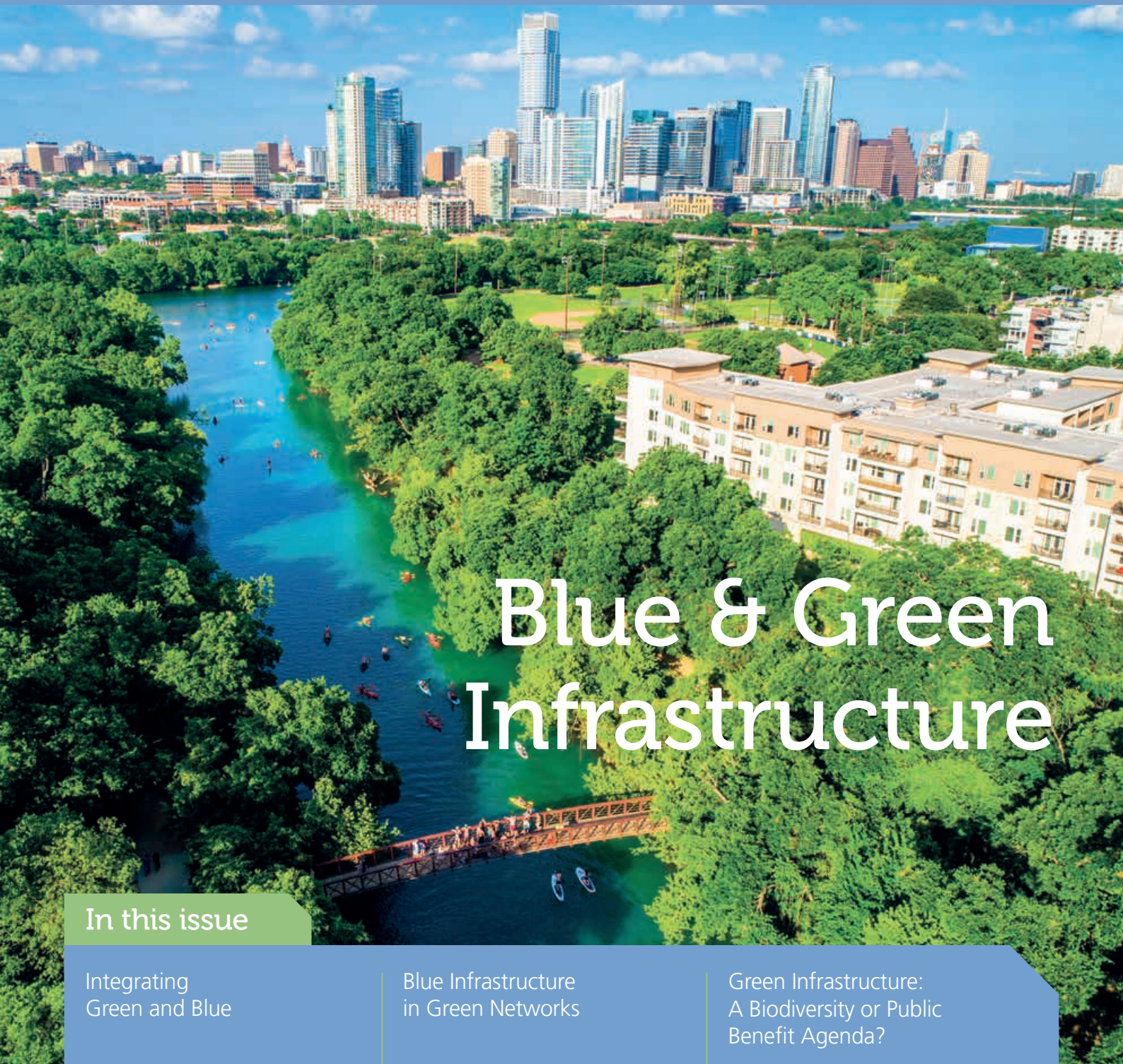
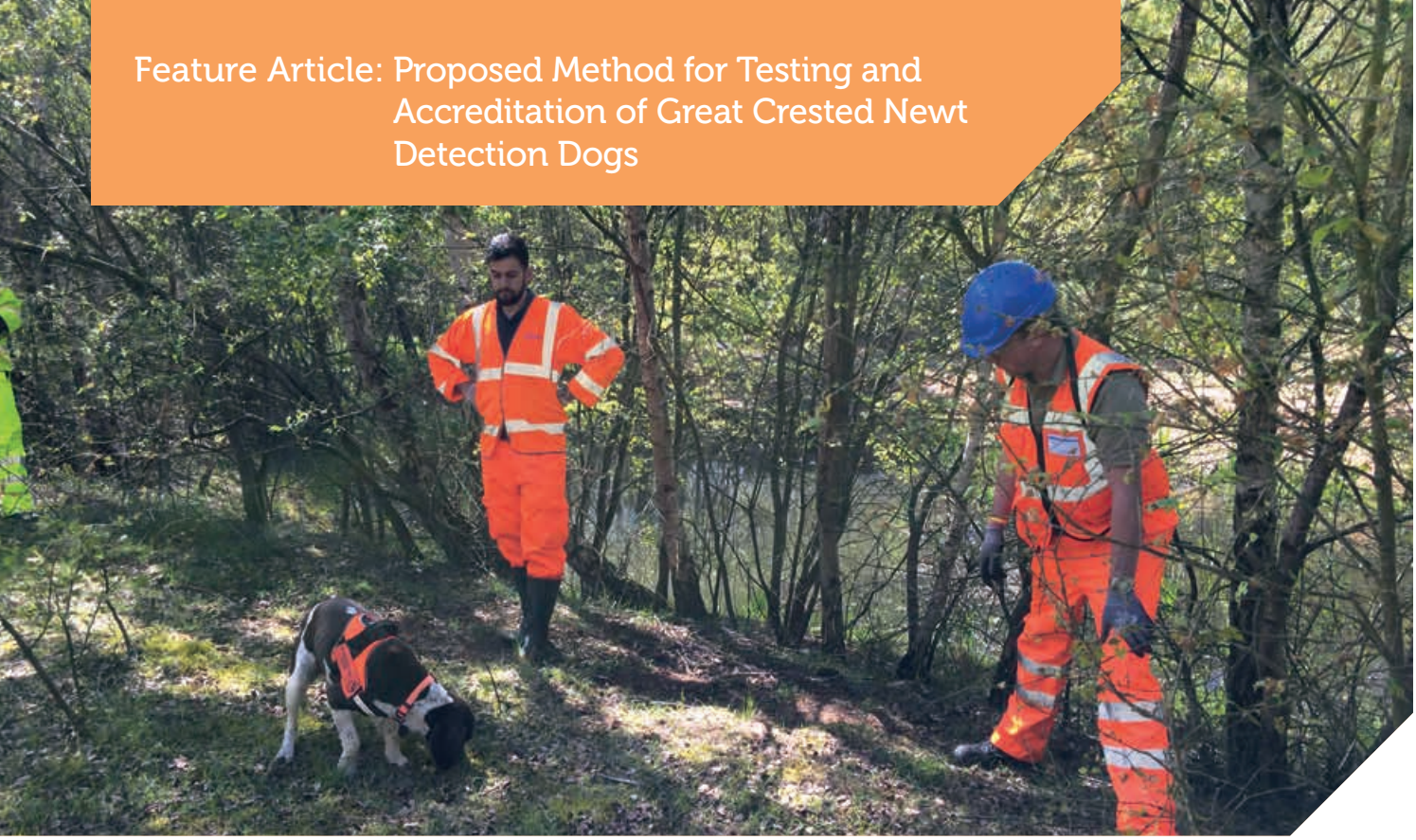


Blue & Green Infrastructure

In this issue



Proposed Method for Testing and Accreditation of Great Crested Newt Detection Dogs

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Interest in the use of search dogs to detect species of conservation importance is rising in the UK, with reports of dog searches leading to improved survey efficiency and higher detection rates than traditional survey methods. However, without a standard methodology for testing and accreditation of dog/handler teams there is a lack of confidence in their use.

Following research to test the ability of detection dog/handler teams to identify and locate great crested newt *Triturus cristatus*, whilst maintaining high welfare and biosecurity standards, we propose a methodology and accreditation system. It is hoped that this will provide a baseline for further testing, refinement of methods and development of standard protocols.

Introduction

A research project to assess the potential of detection dogs to locate great crested newt (GCN) was undertaken on behalf of HS2 Ltd. A rigorous testing method was employed to determine whether dog/handler teams could reliably distinguish GCN scent from other UK amphibians, and locate GCN in the natural environment. Two dog/handler teams were tested, both of which were able to detect the scent of GCN in controlled conditions and in habitat searches. HS2 Ltd have included the use of a suitably trained dog and handler to aid detection of GCN in conjunction with other methods within its organisational GCN Licence.

The potential advantages of using dogs to detect GCN include: the ability to identify presence of GCN outside aquatic survey windows, a reduced requirement for suitable weather for GCN dispersal prior to their capture through *in situ* detection, and the speed at which a dog can search an area of terrestrial habitat. Preliminary search timings suggest that approximately 2-3 km of linear features or sites < 5 ha could be searched within a day. Detection dogs could also be used to reduce time on destructive searches, prior to the removal of amphibian fencing or where lengthy hand searching by humans is unfavourable, such as along railway lines or highways verges. Early confirmation of GCN by dogs may provide sufficient data to take advantage of Natural England Licencing Policy 4, which allows use of reduced or older survey data where impacts can be predicted with confidence.

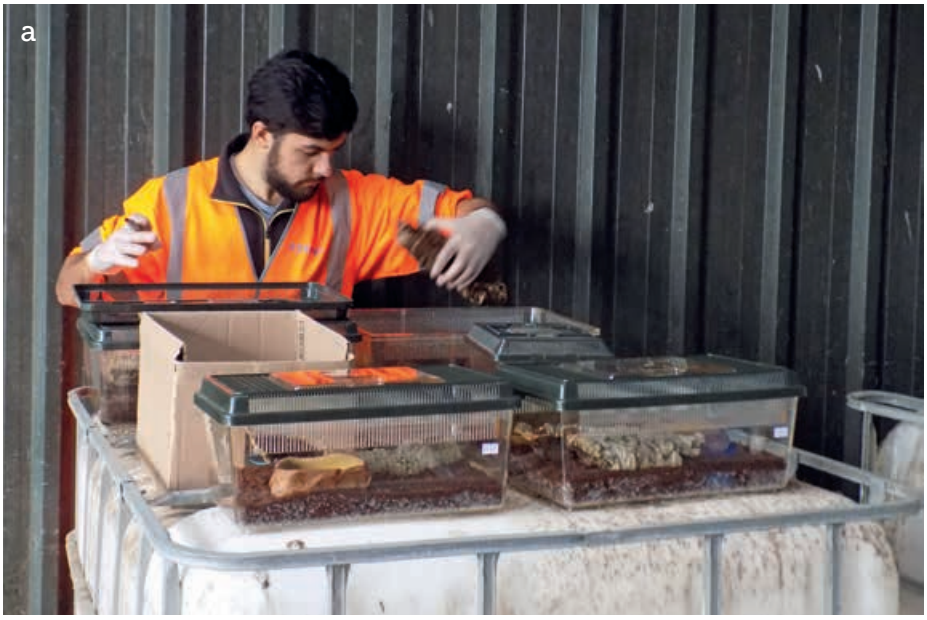


Figure 1a. Preparation for great crested newt detection testing. Tanks used for keeping great crested newts in captivity. Photo credit Ste Nisbet, Atkins (August 2017).

The use of dogs in detection work is currently unregulated in the UK and there has recently been a call for guidance on the use of detection dogs for ecological survey (Coleing *et al*. 2018). The complexity of both training and testing dogs for detection of GCN and the requirement to guarantee both dog and GCN welfare strongly supports the need for an accreditation system. This should:

- Be scientifically robust
- Mimic scenarios that will be encountered in operational searches
- Be feasible for dog/handler teams in terms of cost and timescale
- Include monitoring of ongoing dog training and re-testing at an appropriate frequency
- Be designed and implemented by those who understand the ecology of the search species in collaboration with those with expertise in dog training, handling and welfare.

Working as a handler with a working dog is a serious long-term commitment. The training required is rigorous and, at the outset of the training, it is not always possible to determine if a dog will have detection ability or will be suitable as a working dog. Before testing of a dog/handler team, training also requires a licence to keep live GCN and relevant experience; Natural England would generally only licence around four GCN to be kept for initial training.

Considerations for GCN detection dog testing: Licensing, Personnel, Biosecurity and Amphibians

GCN are a European Protected Species, so testing must be carried out under an appropriate scientific licence issued by the statutory nature conservation organisation for the taking, possession and transport of GCN as a minimum. A standard GCN survey licence would be insufficient to cover this type of work.

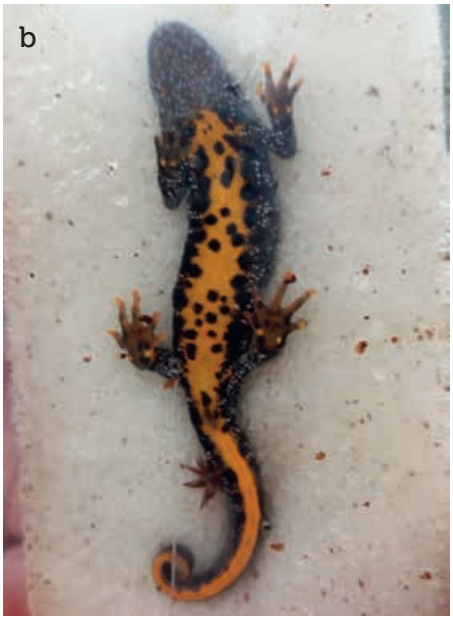


Figure 1b. Belly pattern image used for identification of a juvenile great crested newt. Photo credit Ste Nisbet, Atkins (August 2017).

All testing and searches for amphibians should be carried out by experienced and licensed ecologists. Between activities, GCN need to be kept in suitable conditions by personnel experienced in keeping amphibians in captivity (Figure 1a).

All elements of the validation and testing should be undertaken in accordance with Amphibian and Reptile Groups of the United Kingdom Advice Note 4, version 2 (ARG UK 2017).

Both palmate newt *Lissotriton helveticus* and smooth newt *Lissotriton vulgaris* are required for scent discrimination tests as well as both common frog *Rana temporaria* and common toad *Bufo bufo*. A sufficient number of GCN are required for scientifically robust testing.

Age and sex data on GCN used in testing must be collected. Belly spot patterns should be used for identification of individuals and monitoring of welfare in captivity (Figure 1b).

Testing of dog/handler team

The proposed tests relate only to the detection of live GCN and to the detection of active (not hibernating) newts in terrestrial open habitat or refugia not in aquatic situations. There are two parts: an initial controlled test to assess the ability of a dog to detect unfamiliar GCN scent (i.e. not using GCN the dog was trained on), and field trials to assess whether a dog can reliably locate GCN individuals in habitat searches.

Part 1: Controlled test for scent discrimination

The procedure for scent discrimination testing is based on that used in the UK for testing and accreditation of explosive detection dogs. For explosives, the test is used as a stand-alone validation test (Porritt *et al.* 2015). Here it is used as a means to avoid undertaking more extensive or complex field trials for dogs who cannot recognise GCN scent, and a method of performing a discrimination test where biosecurity protocols can be implemented.

Test implementation

Testing should be undertaken double blind such that the dog/handler team and 'observer' are not aware of the test set-up. Two people in addition to the dog handler are required as a minimum: one as the 'tester' and one as observer. Extra people to help with set-up will speed things up whilst also maintaining biosecurity.

Requirements

- an outside testing area adjacent to a building or other cover (Figure 2)
- 96 sterilised containers with air holes, e.g. flour shakers
- 10 GCN the dog has not encountered before (ideally including adult males, females and juveniles)
- a minimum of five individuals per species of each other amphibian: smooth newt, palmate newt, common frog and common toad
- other scents that the dog may have encountered during training or associated with captive GCN such as handling gloves and soil (but which have had no contact with GCN).

Set-up

1. The GCN, other amphibians and other scents are placed in the containers by the tester at least 30 minutes ahead of testing.
2. Eight containers are placed in numbered holes in a testing rig (wooden planks with a plastic-coated top and holes drilled into the planks to secure the containers, with numbered stickers next to each hole, see Figure 2). The distance between containers should reduce the likelihood of interference between scents and minimise the risk of the dog passing containers too quickly to detect scent (1 m recommended). The layout of the containers in the rig is determined using computer software: Canine Odour Discrimination Software (Defence Science and Technology Laboratories, UK, available as detailed in Porritt *et al*. 2015) for those containing GCN and a random number generator for non-GCN.
3. This is repeated to create 12 runs of eight containers, with each individual GCN being used once (one container in each of 10 runs) and leaving two runs with no GCN (blank runs).
4. The dog/handler teams and observer must be out of sight whilst each run is being set up. The tester moves out of sight of the rig during the dog search and observation.

Procedure

The discrimination test comprises a series of searches along 12 runs of eight containers (Figure 2).

Before the start of the test, the dog/handler team may carry out one or two training runs using containers with no GCN to ensure that the dog is searching effectively.

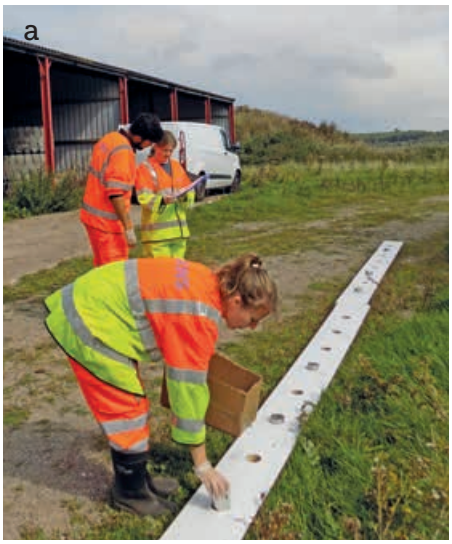
The dog/handler team then search along a run of eight containers; the dog is allowed to return to the previous container but no further back along the rig. During the run, the handler makes one of three calls:

1. 'Container no. X' when the dog has indicated GCN presence in a container
2. 'Blank' when no indications have been given on any containers along the run, or
3. 'Interest in container no. X' where they have observed a reaction from the dog but not a full indication of the presence of GCN.

If 1 or 2 is called, the tester confirms whether this is correct, the dog is rewarded and the run is ended. If 3 is called, this is recorded in silence and the search of the run continued. The dog cannot repeat the run.

The observer records whether the dog behaviour is consistent with the handler calls, for example to verify that the dog handler is calling the same container number which the dog is indicating on.

The same procedure is repeated for all 12 runs.



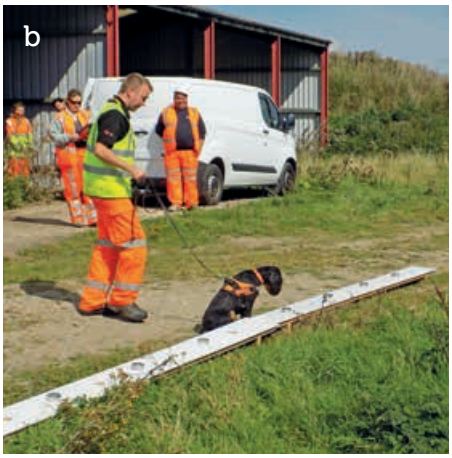


Figure 2. Controlled test for scent discrimination: a) setting up the testing rig, b) newt detection dog Rocky (with handler Aran) from Conservation Dogs sitting alongside testing rig to indicate a container with a great crested newt. Photo credit Luke Gorman, Atkins (August 2017).

Outcome

To pass the test, the dog/handler team is required to correctly locate of 8 out of 10 GCN with no more than two false indications. The dog/handler team fail the test if 5 out of 10 GCN or fewer are correctly located, or four or more false indications are given. Intermediate scores require further evaluation, accepting that many factors could affect the results.

Part 2: Controlled field trial in natural habitat

The trial aims to mimic natural terrestrial search conditions; here, the approach for open habitat is described but this approach can be modified for refugia. Where a dog is intended to work in open habitat and on refugia, testing of both would be required. No containers are used as dogs are able to detect ground disturbance (e.g. pits dug to contain GCN) and the scent of containers such as tins, tubs or containers made out of natural material. The field trial gives a detection rate (i.e. number of GCN detected / total number of GCN present) for the dog/ handler team as well as a frequency of false indications where the dog highlights the presence of GCN where none are present.

Trial implementation

The trial site must be within suitable GCN habitat at the site where GCN have been collected, to reduce welfare and biosecurity risks in the event of GCN escaping.

Testing should be undertaken single blind for practical reasons and to ensure GCN welfare, i.e. people with knowledge of the trial set-up are present during dog searches, but the dog handler is not aware if, or how many, GCN are present in any search plot.

A minimum of two people in addition to the dog/handler team are required but extra helpers will speed things up. With four people, the trial takes between two and three days to complete.

Requirements

- Five plots of approximately 40 m^2 (suitable for a dog search lasting no more than 30 minutes) comprising suitable terrestrial habitat for GCN, ideally balancing amounts of cover for GCN with ease of search, recording and observation.
- Plot margins demarcated such that GCN can be easily seen if trying to leave the plot, for example a shallow trench around the plot where there is a light-coloured substrate (see Figure 3).
- 20 GCN caught on site.

Procedure

- Observers walk around the plot disturbing the ground as if releasing GCN, to control for detection of disturbance.
- Observers release between zero and four GCN into the plot (appropriate for the plot size and cover) under vegetation and in shade, then monitor from outside the plot boundary until the GCN are reasonably static (for approximately 30 minutes). In test trials, most GCN stayed in place, some found alternative refuge near to where they had been placed and the few that tried to leave were replaced in the plot and settled down.
- Observers move away from GCN release locations.
- The dog/handler team search the plot, moving back and forth in closely spaced transects.

Figure 3. Field trial for scent detection. Trenched plot for controlled field trials a) in October 2017 and b) in June 2018 (mixed moss / grass / leaf litter). Photo credit Victoria Sloan, Atkins.

- The dog handler calls for a hand search wherever they feel that a GCN has been detected, clarifying whether this is 'indication' or 'interest'. Interest insufficient to call for a hand search may also be flagged by the handler, and areas can be re-checked as desired. When a hand search is called, the dog search is stopped and a hand search for GCN is undertaken immediately by the observer (experienced ecologist with responsibility under the licence). Observers only enter the plot through the area which has already been searched. The dog is rewarded for correct indications when a GCN is found.
- An observer records the coverage of the search area by the dog, the search calls made by the dog handler and notes whether they felt observations made by the dog handler were consistent with dog behaviour.
- Searches are repeated (rotating around the plots) until the dog has searched for a total of 20 (different) GCN and at least 2 plots with no GCN (i.e. blanks).

Outcome

To pass the field trial, the dog/handler team is required to locate 15 out of 20 GCN with no more than five false indications. However, the direct reporting of trial results may also be useful at this stage to enable further assessment of whether a particular dog could be used in different scenarios.

Accreditation

The Conservation Dogs Programme run by the New Zealand Department of Conservation is an accreditation scheme that has provided a model for our recommended UK accreditation scheme, as follows:

1. The dog handler makes an application to the accreditation body providing evidence of experience in dog handling and experience relating to GCN.
2. An interview based on a questionnaire tests the experience level of the handler and ensures the welfare of the dog.
3. If acceptable, the dog/handler team carry out two tests while being observed by someone with knowledge of GCN detection by dogs. They need to pass the first test to progress to the second.
   - Test 1: A controlled test of scent discrimination.
   - Test 2: A controlled field trial for GCN detection in natural habitat.
4. The overall pass level takes into account the results of the tests and the expert observations. Constructive feedback is given to any dog/handler team who do not achieve accreditation.
5. Accreditation is granted subject to a re-test of scent discrimination (test 1) at two-yearly intervals plus submission of a log of training and GCN searches carried out in the interim.
6. Accreditation is issued to a dog/handler team based on the success of the field trials; if the dog/handler team performed well in open field trials but not in refugia trials they may only be accredited to conduct searches in open habitat. The accreditation system may allow for swapping between handlers for a single dog where the handlers can demonstrate handling skills and long-term involvement with the dog in question.

An accreditation body would need to be appointed in the UK and the reviewers of the applications, interviews and tests (i.e. the accreditors) would need to be experienced both in dog handling and GCN to suitably assess candidates.

Conclusions

The training and testing of conservation search dogs to detect great crested newts or other species takes hard work and a high level of commitment over a long period. Only a few dogs are suitable and there are challenges around animal welfare, the availability and use of species for testing, and species licensing issues.

However, there is great potential for conservation dogs to detect cryptic species in the natural environment leading to more efficient searches for survey and mitigation, and expanding survey areas and seasons.

As interest in this approach grows, the UK needs standard methodologies and an accreditation system to ensure consistently high standards. The proposed testing protocol summarised in this article does not cover all possible uses of detection dogs and we invite comments and engagement from those with an interest to enable further development and refinement.

Detection Dogs Working Group

The Detection Dogs in Britain and Ireland Working Group has recently been formed. One of the groups' purposes is to share knowledge and raise awareness of detection dog work in ecology and conservation. To find out about this group and other initiatives, join discussions, share links and experiences, access scientific and 'grey literature' relating to the subject, and help collaboration a Facebook group has been set up. Please contact the authors for more information.

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