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A call for guidance on the use of detection dogs for ecological surveys in the UK

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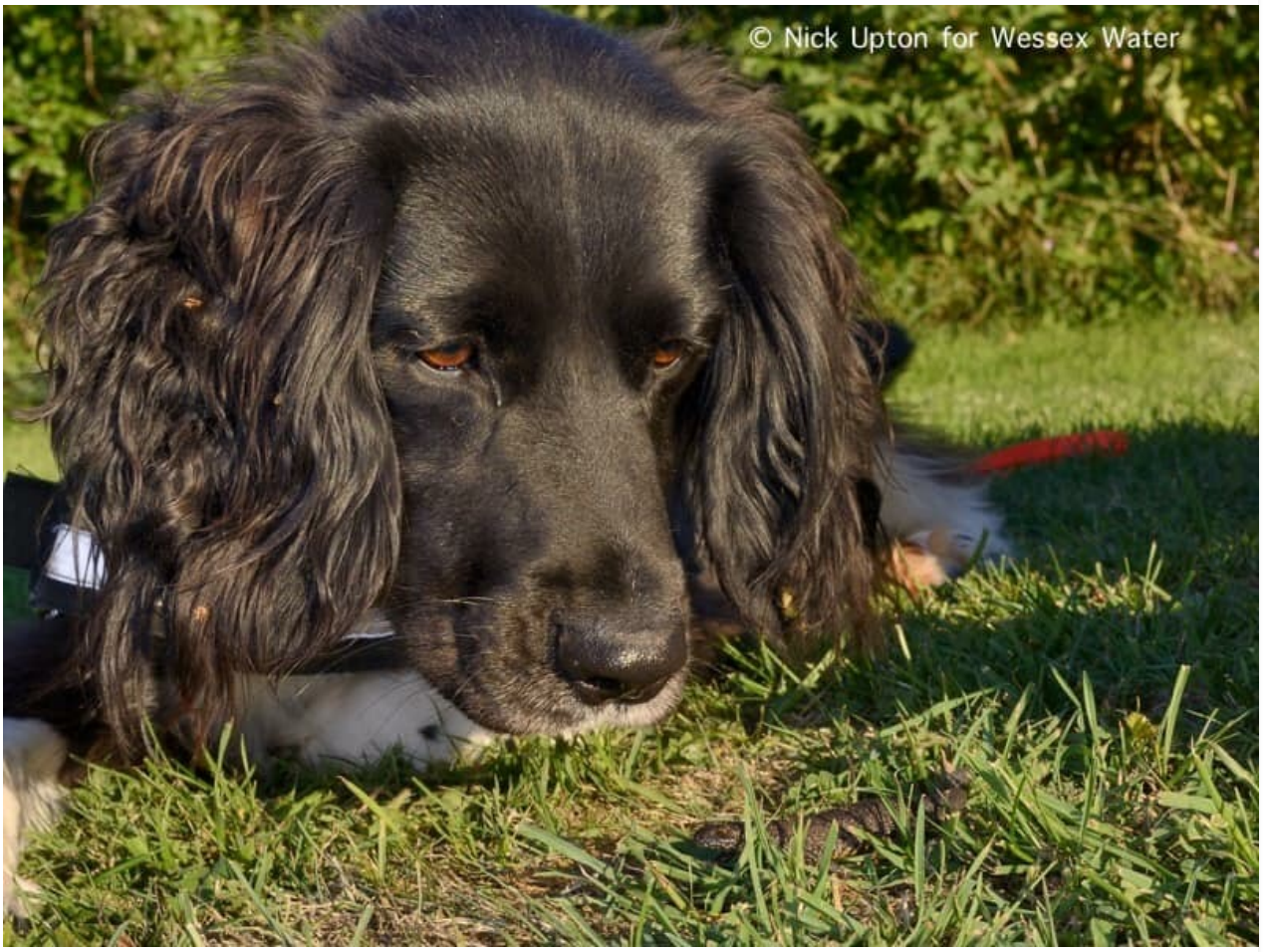

Detection dogs are widely used in wildlife survey, research and conservation roles internationally, and increasingly also in the UK in recent years. This article

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detection dogs to ensure quality results from surveys, with low risk to wildlife,

and good welfare standards for working dogs. In addition, the article explores aspects that such guidance should consider. The authors would be keen to contribute to this endeavour and would welcome contact and views from others in this field…

What can detection dogs do and how effective are they?

The international use of detection dogs to find wildlife, carcasses, scats, pathogens, or plants has expanded quickly in recent years, and is often found to be cost effective as compared to other methods (Goodwin et al., 2010; Paula et al., 2011; Kauhala and Salonen, 2012; Sheehy et al., 2014; Beebe et al., 2016; Oldenburg et al., 2016; Hayes et al., 2018). With occasional exceptions (e.g. O'Conner et al. 2012) detection dogs have been found to be more efficient when compared to established survey methods in detecting the presence or absence and relative abundance of wildlife and plants, including faster search times, locating signs at lower densities and/or covering more extensive areas (e.g. Beebe et al., 2016; Stanhope, 2015). This provides the potential to expand survey areas and seasons as well as reduce costs as compared to human-only searches.

The use of ecology detection dogs in the UK seems likely to expand in coming years. Detection dogs have been used successfully to locate bat carcasses during ecological monitoring of wind turbine developments (Stanhope 2015, Mathews et al., 2013), in pine marten research (Sheehy et al., 2013), great crested newt monitoring, dormouse surveys, hedgehog surveys and water vole surveying and monitoring (Table 1).

Survey type	Current Status	Notes	References / sources
Bat carcass	Papers published incl. UK	Bat carcass detection for wind turbine monitoring	Mathews *et al.*, 2013; Stanhope 2015
Bat roost	Papers published - outside UK	Trees could be detected within 30m. May help to reduce survey time and/or identify specific species	Chambers *et al.*, 2015
Badger *Meles meles*	Papers published - outside UK	Research into the home range of badgers conducted with detection dogs	Kauhala and Salonen, 2012
Dormouse *Muscardinus avellanarius*	Field trials in progress	Dogs detect nest material and feeding signs. Potential licensing/disturbance issues	Cheshire Life, August, 2014
Great crested newt	Field trials in progress / surveys carried out	Dogs used to search terrestrial habitat. Potential licensing/disturbance issues	BBC News, June 2016
Pine marten	Papers published - UK	Dogs used for scat detection for abundance estimate	Sheehy *et al.*, 2014
Harvest Mouse *Micromys minutus*	Field trials in progress	Dogs trained to detect scat to reduce disturbance	The Guardian, September 2016
Water vole	Surveys carried out	Dogs used to look for signs of water vole. Potential licensing / disturbance issues. Figure 1A and 1B	Government Press Release, October 2015
Otter *Lutra lutra*	Papers published - outside UK	Dogs showed generalisation to otter spraints when presented with spraints of varying ages	Oldenburg *et al.*, 2016
Hedgehog	Field trials in progress	Dogs used to detect hibernation nests and individuals	Lead author: Lucy Bearman-Brown (Hartpury University) alongside Louise Wilson, unpublished data
Bird Carcass	Papers published - outside UK	Dogs significantly more efficient at detecting avian carcasses than human-only searches	Paula *et al.*, 2011
Live Birds	Papers published - outside UK	Dogs used to locate nests and broods of specific species. Potential disturbance / licensing issues	Dahlgren *et al.*, 2010
Reptiles	Papers published - outside UK	Dogs used to detect lizards, geckos, snakes and tortoises.	e.g. Browne *et al.*, 2015
Amphibians other than GCN	Papers published - outside UK	Dog found able to differentiate between species of Bullfrog	Matthew, 2016
White-clawed crayfish *Austropotamobius pallipes*	Field trials needed	No surveys found, but e.g. Richards 2018, suggests it may well be practicable	n/a
Invertebrates	Papers published - UK	Dogs used to detect bee nests	Waters *et al.*, 2011
Plant community	Field trials needed	Potential to for use of dogs to detect indicator or rare species.	Goodwin *et al.*, 2010
Plant species	Papers published - outside UK	The use of detection dogs reduced survey time required to find rare species	Browne and Stafford, 2003
Chytrid	Papers published - outside UK	Dogs able to detect *Batrachochytrium dendrobatidis* Need biosecurity measures	Matthew, 2016

Table 1: A summary of potential and current roles for detection dogs in ecological surveying and monitoring the UK

How to get good results from ecology detection dogs?

Henry (Conservation K9) – trained on hedgehog – is indicating non-invasively. Henry is now working with Hartpury University (Lucy Bearman-Brown) to help detect hibernating hedgehogs (Credit: Louise Wilson)

Factors such as weather conditions, habitat characteristics and target scent properties can influence the timing and efficiency of searches by scent detection dogs (Paula et al., 2011; Hayes et al., 2018). For example, dry weather may affect a dog's nasal tissue dryness and molecular composition of the odour (Paula et al., 2011). Therefore, surveys need to be carefully designed to allow adequate detection time relevant to the conditions of the survey.

Detection dogs generally are selected for behavioural characteristics such as food, toy or play motivation, endurance, independence, boldness, high athleticism and a low propensity for distraction while searching (Hayes et al., 2018). Well-selected dogs trained by an experienced professional are essential for confidence in the results of wildlife surveys (Beebe, 2016). Positive reinforcement with operant conditioning has been used successfully in training (Hayes et al., 2018).

It may be tempting to train an existing pet dog in wildlife detection. However, traits important for detection dogs, such as boldness and high athleticism, differ from those sought for or trained into a companion dog, such as calmness and sociability (King et al., 2009). By contrast, the re-training of experienced working dogs and handlers for wildlife detection may be a practical option (Orkin et al. 2016). The experience of handlers as well as dogs is important for accuracy and reliability of results. A handler needs to have a good working partnership with a dog and be able to correctly interpret the dog's signals (Beebe et al., 2016).

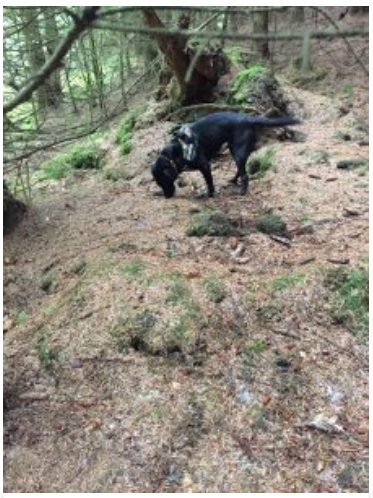
Guidance should encourage reliable results from ecology detection dogs by stipulating that appropriate training should be provided by a professional, and that surveys should take account of site-specific conditions and survey objectives.

Box 1: Case Study – Hunting for Pine Marten in Shropshire

The Shropshire Pine Marten Project began in 2009 with the aim of investigating reported sightings of pine martens in the county. Shropshire Mammal Group and Wildlife Trust now use detection dogs to assist with pine marten searches. An ecologist, and a dog and handler (provided by K9 Conservation Consultancy) search for pine marten scats. The dog does most of the searching, and indicates

new areas. Better detection of scat has enabled more effective siting of trail cameras and more samples to be collected for DNA testing. This illustrates the

value of using detection dogs alongside other survey techniques.



Hunting for Pine Marten scats in Shropshire (Credit: Louise Wilson)

Demonstrating likely absence of a species from a site

It can be challenging to determine likely absence of a target species with reasonable confidence in the UK, especially given the dearth of evidence-based guidance (Abrahams and Nash, 2018). To date, detection dogs in the UK have generally been used to reduce the search time and effort required to establish presence, for example of bat carcasses (Mathews et al. 2013). However, detection dogs can also be used to infer likely absence, as demonstrated by the widespread use of detection dogs for explosive searches (Furton and Myers, 2001). Experience and training is, of course, crucial to success.

Guidance should encourage research that underpins the evidence-base for species-specific guidelines, especially with regard to determining likely absence.

Are detection dogs safe for wildlife?

In some cases, surveys using dogs can be less intrusive than other methods, such as telemetry (Kauhala and Salonen, 2012). Reduced survey time, as compared to human-only searches, may reduce disturbance effects overall. However, detection dogs can cause stress to wildlife (e.g. Langston et al., 2007) and may potentially harm the target or other species in the survey area. These other species in theory could include humans; although well trained dogs should be socialised to working alongside people, risk assessments for enclosed work environments may need to consider dog allergies. This underlines the importance of experienced and well-trained handler and dog teams when conducting wildlife detection work, and adapting survey techniques to the likely risks. Disturbance can be reduced if signs such as scat are detected rather than the animal itself or its resting place (e.g. The Guardian, 2015), and leashes and muzzles may also be useful for some survey types.

Survey-specific guidance would be helpful, with the relevant licensing authorities involved, where protected species or sites could be affected.

Box 2: Case Study – Surveying for Great Crested Newts

Detection dogs can potentially aid searches for great crested newt. Field trials are underway for Wessex Water with a detection dog in training with K9 Conservation Consultancy, carried out according to European Protected Species licensing requirements. Ecology detection dogs should be assessed at the earliest stages for suitability, and long-term mentoring and training is required

Are there risks to detection dogs?

Louise Wilson (Director of Conservation K9 Consultancy) water vole search training on paddle boards for ease of access in water resources (Credit: Louise Wilson)

The general welfare considerations for working dogs, including those used in drug or explosive detection include the basic five freedoms (freedom from hunger and thirst; discomfort; pain, injury or disease; fear or distress; and freedom to express natural behaviours; Rooney et al. 2009). Other considerations for working dog welfare include a working directive (the length of time a dog can work), health checks after working and recommendations relating to working conditions such as temperature, safety and biosecurity measures. Although dogs can potentially safely access a wider range of sites than people, they may still be unable to safely search dense, thorny vegetation for example (Stanhope, 2015). There are some potential risks to dog health associated with particular survey types and sites, for example relating to the inhalation of potentially hazardous substances or allergens (Wismer et al.2003). Measures can be taken to protect dogs using face guards, booties, neoprene jackets and ear guards.

Guidance relating to working conditions and protective equipment for dogs may be helpful.

Conclusions and suggestion for next steps

There is tremendous potential in the use of ecology detection dogs for survey and monitoring in the UK. However, there are important considerations in terms of the quality of survey data, risks to wildlife, and ensuring good welfare standards for working dogs.

> 'In the absence of clear guidelines, we urge those wanting to invest in one or more dogs for conservation purposes to proceed with extreme caution and, preferably, under the watchful eyes of an experienced professional' (Beebe et al., 2016)

We call here for suitable guidance to be developed for the responsible and effective use of detection dogs in conservation. This should be high quality and evidence-based, involving key partners such as the country agencies, practitioners, consultants, NGOs and professional bodies such as the Chartered Institute of Ecology and Environmental Management at the earliest stages.

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Header image: Freya the great crested newt detection dog owner by Nikki Glover of Wessex water. Credit: ©Nick Upton.

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Louise Wilson is Director of Conservation K9. With 15 years' experience as a specialist dog trainer and handler

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