Guidance on key questions for selecting a conservation detection dog team

Ecology Detection Dogs of Britain and Ireland Working Group

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Britain & Ireland Working Group

This document is a product of the Research Theme in the Ecology Detection Dogs Britain and Ireland Working Group (https://www.ecologydetectiondogwg.org).

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Aim

This white paper aims to provide an overview of the key topics to be discussed with a conservation detection dog handler team (CDDHT), when considering hiring one for an ecological project. Each area of interest will be defined and justified, and a summary of the important questions to be asked will be given. Utilising this resource will equip those who would like to work with a CDDHT with the knowledge required to assess whether a particular CDDHT is the right fit for them and their project.

Introduction

Conservation, or ecology detection dogs (CDD) are a type of working scent detection dog that specifically supports conservation projects (MacKay *et al*., 2008; Helton, 2009; Woollett, Hurt and Richards, 2013) and work alongside a human handler to form CDD handler teams (CDDHT) (Richards *et al*., 2021). CDD's are highly complementary to existing conservation monitoring techniques and offer many benefits (Browne, Stafford and Fordham, 2006; MacKay *et al*., 2008; Kerley, 2010; Grimm-Seyfarth and Klenke, 2018; Richards, 2018; Stanhope and Sloan, 2019). However, not all CDDHT are the same and different CDDHT will operate in distinctive ways, as demonstrated in McKeague, Finlay and Rooney 2024. Furthermore, CDDHT can be resource-intensive, due to the time it takes to train a team and the cost of maintaining the CDD (MacKay *et al*., 2008; Kerley, 2010), which may affect project planning.
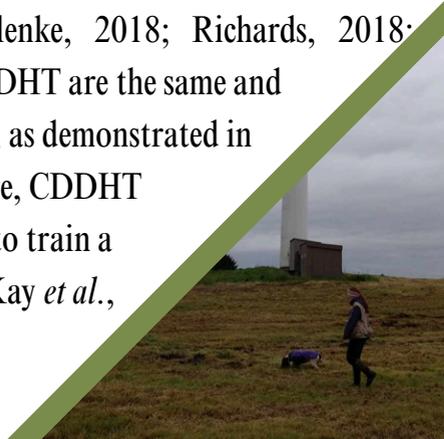
As such, those who are considering hiring a CDDHT for an ecological project may be wondering how to decide what characteristics to seek out, and why. People in this category should not be afraid to ask questions to assess the quality of a CDDHT and how well they match to a specific project. Likewise, any CDDHT seeking to work within ecology should be prepared to explain how they operate and learn about the potential project, as it is just as important that the CDDHT believes the project in question is a good fit for them. By ensuring that both parties are satisfied and comfortable in working together, there is a better likelihood for the desired project outcomes to be achieved.

Key Questions

The Project in Question: *The project that a person is seeking a CDDHT for and all the project's key elements, which will determine how a CDDHT may operate in this specific circumstance.*

This is the one area where the onus of information is on the person or group choosing to hire a CDDHT. Without a clear picture of what a project is (e.g., aim, methods, etc.), a CDDHT cannot decide their suitability and capability in this case. It should be noted that the degree to which a CDDHT will or will not suit a project will likely be subjective and dependent on past experience, which will be elaborated on later in this document. Furthermore, it should be considered what stage or stages of the project the CDDHT is being assigned to (e.g., searching a specific area, first or last sweep of a site, etc.) and why, as this can alter the training of the CDD and the behaviour of the CDDHT during searches. As such, in order to understand the project as a whole, answers to these questions should be provided to the CDDHT:

- **What is/are the target species for this project? Additionally, please provide information on species of the same taxonomic order that may be present during searches.**

● **What is the purpose of the project (i.e., to find all individuals of a population or just a sub sample) and intended measures (e.g., presence/absence, population estimate, translocation, etc.)?**

  ● Based on this question, do you require the CDDHT to undertake any activities post-find (e.g., sample collection, location marking, camera trap placement, etc.)?

● **How vulnerable is the target species and are there any concerns regarding the vulnerability status and interactions with the CDDHT?**

  ● Based on this question, will the CDDHT require any specific licenses or equipment to work with the target species (e.g., biosecurity concerns, IUCN status, etc.)?

● **What type of target are you planning to search for with the CDDHT (e.g., carcass - whole or otherwise, live specimen, scat, etc.), are they visually identifiable, and at what stage of development (i.e., age/condition)?**

  ● If it's a novel odour, can you provide samples of the target species and if so, in what form?

● **Where exactly will searches with the CDDHT take place (e.g., geographical location, terrain, vegetation, weather, etc.)?**

  ● Based on this question, are there any hazards or specific precautions that the CDDHT should be aware of?

- **What is the estimated timeline of the project, and have you accounted for CDDHT-specific elements (e.g., training and testing, travelling with a CDD, etc.)?**

Training & Testing:	*The type of training and testing methods a CDD and their handler have been through and how this can affect the team's strengths and weaknesses in the field, as well as efficacy (the ability for the CDD to produce the desired effect of their training, usually locating a specific target).*

Training is the basis by which a CDD and their handler familiarises with search expectations, and a target odour via imprinting (Mosconi *et al.*, 2017), and testing is how a CDDHT ensures that the training has worked and the CDD can find targets outside of training parameters. There is no doubt that training can take many forms (DeMatteo, Davenport and Wilson, 2019), and techniques will likely differ both subtly and greatly between different CDDHTs. This does not inherently mean that one method will be better than another, but it can alter the abilities and advantages of a CDDHT. For example, if a project search will be taking place in a dense forest area yet the CDDHT has never conducted testing or training in a similar location, then their ability to conduct a high standard of search in this circumstance may be brought into question, which is reasonable. At the same time, a CDDHT may simply need some time to test under project-like conditions, and then they will be more than up to the task.

There is also the fact that a great deal can be gleaned from the training and testing methods used by a CDDHT regarding the efficacy they may display under field conditions. In short, the more samples used, the more varied these samples (Johnen, Heuwieser and Fischer-Tenhagen, 2017), contamination procedures for samples (Goss, 2019; Guest *et al.*, 2020; Lazarowski *et al.*, 2020; Kokocińska-Kusiak *et al.*, 2021; Whitehouse-Tedd, Richards and Parker, 2021), and the use of randomisation when placing samples out for the CDD (Johnen, Heuwieser and

Fischer-Tenhagen, 2015 & 2017), will all together provide a detailed picture of the quality of training and testing a CDD has received and a good indication of how reliable their field results may be. In order to assess the level of training and testing a CDDHT has conducted and what this means for project outcomes, these questions should be answered by the CDDHT:

- **Please describe the techniques used during the training stage, including but not limited to:**
  - Imprinting.
  - Samples used (i.e., types, how many were used, how they were stored and handled, how often were they reused, life stages, sizes).
  - Contamination control procedures on training materials.
  - Locations/habitats where training took place.

- **Please describe the techniques used during the testing stage, including but not limited to:**
  - Use of discrimination trials (i.e., method of testing the CDD's ability to find their target odour versus other odours).
  - Samples used (i.e., types, how many were used, how they were stored and handled, how often were they reused, were they different to those used in training, life stages, sizes).
  - Randomisation.
  - Blinding (i.e., who knows amongst the party where a sample is hidden) can be single or double, which refers to how many of the party members are blinded to information (Monaghan et al., 2021). Double is preferred.

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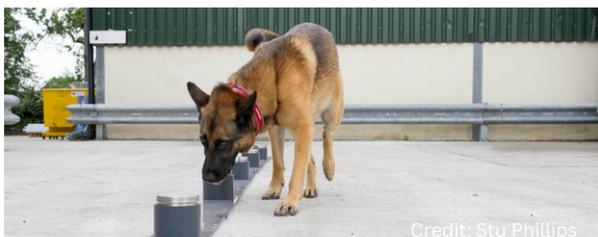
- Locations/habitats where testing took place along with testing set-up (e.g., line-up of samples, sample hidden in a field setting, etc.).

- If the testing phase is not part of the project outcomes, what efficacy rates were achieved by the CDDHT during testing, including sensitivity (i.e., "proportion of targets found relative to the total number of targets available" (Bennett, Hauser and Moore, 2020, p.5)) and precision (i.e., "proportion of all alerts that are directed towards a true target" (Bennett, Hauser and Moore, 2020, p.5))?

N.B. Efficacy rates can vary greatly and what is considered an appropriate rate can depend on the type of search, please see Appendix I in McKeague, Finlay and Rooney (2024).


Previous Experience: *The level of operational field experience both a CDD and their handler have separately and together, and the impact this can have on their adaptability and how they behave.*

CDD are biological systems and therefore subject to variability (Kokocińska-Kusiak *et al.*, 2021), but their behaviour is more predictable when one knows what they have faced in previous searches. Indeed, in McKeague *et al.* (2024) participants who have used CDD previously for seabird research discuss how the specific conditions faced during certain projects meant that specialised training for the CDD had to be conducted, for example for travelling by boat or the CDD having to wear protective gear. The more practice that a CDDHT has had under specific conditions, such as terrain, vegetation, and weather conditions which have been shown to affect CDD efficacy (Wasser *et al.*, 2004; Bennett, 2015; Beebe, Howell and Bennett,

Lazarowski *et al.,* 2020; Kokocińska-Kusiak *et al.*, 2021), the more likely they are to cope well under these conditions in the future. Additionally, a key factor in dog selection criteria according to participants was the experience and reputation of the CDD. These factors highlight how having previous field experience can affect the ability of a CDDHT to adapt and handle new circumstances. Previous experience can refer to the amount of time spent conducting real searches under operational conditions (i.e., outside of training/testing), the number of operational projects a CDDHT have worked on, or the length of time since they have been considered to be at an operational standard. Notably, how the people around the dog(s), most importantly the handler, behave and even think (Lit, Schweitzer and Oberbauer, 2011; Jamieson, Baxter and Murray, 2018b; Lazarowski *et al.*, 2019, 2020) can impact the behaviour of the dog(s) (MacKay *et al.,* 2008; Hayes *et al.*, 2018; Jamieson, Baxter and Murray, 2018a), meaning that the experience of the handler and even those present during searches is just as important. In order to assess the level of experience a CDDHT has, these questions should be answered by the CDDHT:

- Please detail any prior ecological projects/surveys that the CDDHT has been involved in including targets and conditions, the outcomes of said project, and the CDDHT efficacy rates if applicable.

- What level of operational experience does the CDD, the handler, and the CDD and the handler together have? This could include length of time, number of searches, number of finds, number of CDD trained, etc.
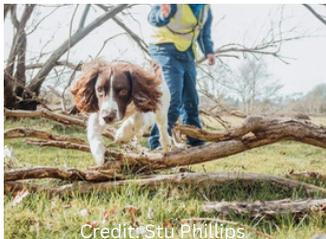
Credit: Stu Phillips

CDD may be imprinted onto more than one target odour across different projects, but this could have an impact on their performance depending on the relation between species and environments.

Having a CDD imprinted onto other target odours is not inherently an issue, but it is important information to know. For example, if a new target odour belongs to a species that commonly lives in the same environment as a previous target odour, then the dog may perform a false positive (i.e., performing an indication on an incorrect target) for the project in question, but this is not actually a false positive in relation to the dog's previous training. Examples of this include Hollerbach *et al.* (2018) during searches for Eurasian lynx, and Kretser *et al.* (2016) while searching for moose. In both of these cases, most of the false positives that occurred were for previously trained targets which although classified as false positives in the context of the study, were not false positives in the context of the dog's training. If this outcome occurs, it can affect project outcomes and efficacy measures, as well as potentially lead to wasted time and energy for the CDDHT by finding numerous non-target odours in a particular search. In order to judge whether other imprinted odours may cause an issue for a project due to odour overlap, these questions should be answered by the CDDHT:

- **Has the CDD been imprinted onto any other odours, and if so, what are they and where did searches take place geographically?**

The efforts taken to ensure the welfare of the dog(s) working as part of a CDDHT and the primary considerations needed to ensure an ethical search is taking place.

For the best outcomes for all parties, a chosen handler should be able to demonstrate a high standard of welfare for any CDD in their care. Animal welfare always matters, and this is the case both for the CDD working and any wildlife encountered in the field. Indeed, higher levels of stress in working dogs, such as guide dogs and explosives detection dogs, has been linked to worse performance (Rooney, Gaines and Hiby, 2009). A well looked after CDD means a healthy and happy dog that will work well because they enjoy working and they are confident working with their handler, therefore a greater likelihood of achieving the desired outcomes of a project in a safe and efficient manner. Assessments of welfare come in many forms, for example, the Five Freedoms of animal welfare (Thorpe and Brambell, 1965), notable signs of stress (Yeates and Main, 2008), and using behaviour to measure health and whether an animal has what it wants (Dawkins, 2004). To broadly cover these different methods of welfare assessment, these questions should be answered by the CDDHT in order to assess that the CDDHT is considerate of dog welfare:

- **Is the CDD handler/trainer comfortable to allow you to watch training or testing sessions (in-person or via video) to observe the dog's behaviour and the relationship demonstrated between the dog and the handler/trainer?**

- **Is the CDD given enough opportunities to stay hydrated and maintain their energy while working in the field?**

- **Does the CDD have the opportunity to rest between searches and are they provided with downtime to exhibit natural behaviours (e.g., play)?**

- **Are the temperatures that the CDD will be working in appropriate for dog welfare and how are these monitored?**

- **Do the CDD have the appropriate and up-to-date vaccines for their age and the environment in which they will be working?**

- **Does the CDD handler have canine first aid training and the necessary first aid equipment?**

- **Can the CDD handler show evidence of following best practice for dog welfare during transport as per the guidelines in their region? ie. containment, ventilation etc.**

Number of CDD available: *A CDD handler may have access to and trained with a number of CDD rather than just an individual. The number of CDD available to a handler can alter how a search is approached.*

Individual differences in dogs have been found to affect scent detection efficacy (Jamieson, Baxter and Murray, 2017), and these play a bigger role in suitability than inherent factors like breed (Grimm-Seyfarth, Harms and Berger, 2021). Additionally, as previously mentioned, the biological nature of CDD means that performance in a search can vary based on a vast range of internal and external factors (Woollett, Hurt and Richards, 2013; Kokocińska-Kusiak *et al*., 2021).

Given these facts, it makes sense that some dogs may be better suited to certain styles of searches over others, and this can relate to terrain, climate, search pace, age, and more. This is not to say that dogs of a particular age are better than others, but rather that assumptions should not be made based on dog characteristics and that the best suited dog for a project simply depends on the project itself. Furthermore, if a project was seeking to survey for several different species, having multiple CDD could mean each CDD is trained on one particular scent which could then reduce false positives overall. In order to aid in the design of a project based on number of CDD available, these questions should be answered by the CDDHT:

- **How many CDD are trained, operational, and currently accessible to work with this handler on this project?**

- **Please provide information about the breeds, diets, ages, overall health, and previously imprinted odours of the dog(s) selected.**

Conclusion

In conclusion, there are many aspects to working with a CDDHT that can affect a project's design and outcomes, some of which you may have been aware of and some not. The key to achieving the best possible results from both your project and the CDDHT is transparency and openness through asking and answering questions. By having clearly communicated expectations, a project can be effectively enhanced by the benefits that a CDDHT has to offer. Cross-discipline collaborations can result in higher-impact research (Wuchty, Jones and Uzzi,

2007), and so these guidelines can help dissuade any concerns about working with a CDDHT, provide a basis for considering how a CDDHT might fit into your project, and encourage you to seek out a CDDHT to work with so you can both continue to support conservation and ecology during this critical time for biodiversity (Ceballos, Ehrlich and Dirzo, 2017; Díaz *et al.*, 2019).

Credit: Stu Phillips

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Appendices

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Appendix 1. Blank Client Project Information

Question	Answer
Purpose of the project	
Species – anything about its ecology that makes it vulnerable or dangerous to the dog?	
Licensing/legislation. Is a licensed person required to accompany the CDD team	
Type of target – scat, carcass, live animal	
Actions to be taken by handler on location of target – take photos, GPS location, collection of samples, ID	
Geographical location – terrain, vegetation	
Biosecurity or health and safety risks	
Timeline	
Any other info	

Appendix 2. Blank Handler Team Q&A

Questions	Answers Checklist	
Training	**Imprinting**:	
	Samples Used:	
	Decontamination:	
	Habitats:	
Testing	**Trials**:	
	Blinding:	
	Sample Used:	
Experience	**Ecological**:	
	Operational:	
	Dog Experience:	
Odours	**Imprinted on**:	
	Geographically:	
Welfare–General	**Water & food**:	
	Veterinary Care:	
Welfare – Work specific	**Viewing**:	
	Rest:	
	Temperatures:	
	First Aid:	
	Transport:	
Dog Team Resources	**Number**:	
	Type:	