



Australasian Conservation Dog Network – Conservation Detection Dog Team Evaluation Guidelines

Guidelines developed by Australasian Conservation Dog
Network Competency Committee and Members

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Table of Contents

Introduction and Statement of Purpose.....	4
Scope	5
Evaluators.....	5
Evaluation guidelines.....	6
Introduction.....	6
Evaluation running sheet.....	6
Section 1: Field Safety and Welfare	8
Section 2: Detection evaluation	14
Alert behaviours.....	14
Survey evaluation design.....	14
Important considerations	16
Data recording and calculations	17
Data sheets and documentation	19
Evaluation frequency.....	22
ACDN Contact information	22
References.....	22
Appendices.....	23

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Introduction and Statement of Purpose

The Australasian Conservation Dog Network (ACDN) developed competency evaluations and guidelines due to the absence of an authorised body in Australia who can license or certify conservation detection dog (CDD) teams. The ACDN prioritises the health, safety and welfare of our CDD teams and that of the wildlife in our work environment. In addition, detection success is paramount to the efficacy of this methodology. Safety, welfare and detection success are therefore the overriding factors that have been prioritised when developing these evaluation guidelines.

Whilst there are numerous ways to assess a detection dog team, our guidelines have prioritised evaluating CDD teams in surveys that represent real-world working requirements, and are tailored to the specific team's target species and project objectives. Evaluations are completed by independent, third-party assessors with no financial or vested interest in the performance of the CDD team.

These detection evaluations are not designed to represent a minimum standard which a team must attain in order to be deemed 'competent'. Instead, these evaluations employ scientifically supported methods to determine a CDD team's search performance (sensitivity), efficiency (the time taken to cover a defined area with a measured search sensitivity) (as outlined in Bennett et al. 2020) and working safety and welfare throughout multiple simulated surveys. These guidelines do, however, provide safety and welfare benchmarks that must be met and considered for all training, evaluations and field deployments. The provision of this information is valuable to CDD teams in highlighting areas for future development, and to potential clients in providing as accurate a representation of CDD teams detection abilities for target species and field safety within relevant environmental areas.

The ACDN evaluation guidelines demonstrate the effectiveness of ACDN member teams participating in the evaluation process. The ACDN does not, however, endorse teams who complete these evaluations. This affords land managers, researchers and practitioners a level of confidence in the services provided by ACDN members. It is the responsibility of ACDN members and their evaluators to undertake and document these evaluations, along with developing supporting documentation of their team's welfare and safety standards (e.g. Job Safety Analysis).

These guidelines have been developed by the ACDN Competency Working Group, and peer-reviewed by national and international experts in this highly specialised field, to ensure that the variety of work CDD teams undertake is represented and completed with shared importance

given to detection success and working team welfare and safety. These guidelines will be reviewed annually, to ensure the most current information is provided. These evaluations are completed independently of the ACDN, however, the ACDN will endeavour to provide guidance where sought. During evaluation development, the authors have looked to experienced operators in Australasia, international evaluation examples and similar fields of work to develop evaluation protocols suitable to Australasian requirements. Evaluation protocols have been designed with a focus on objective criteria and outcomes, allowing protocols to be administered by a range of people. This helps minimise the financial cost of conservation activities, while maintaining confidence in the team's abilities.

The guidelines separate evaluation protocols into two main areas:

1. To establish competency (i.e. cue reliability) at essential and non-essential behaviours required for CDD teams (handler and dog) to operate safely and effectively in the working environment and around distractions (e.g. animals, vehicles and people); and
2. To establish a team's search efficiency and detection sensitivity when conducting work in a simulated field environment.

Scope

The evaluations described in this document have been developed to specifically assess field deployable detection dog teams who detect and alert to their target species or biological samples – called through this document as Conservation Detection Dog (CDD) teams. These evaluations have not been developed for Guardian dogs, hunting dogs or bailing dogs.

Evaluators

Evaluators should not have a financial or vested interest in the performance of the detection dog team. This includes people who may be currently working professionally together, whether through research projects, the training of a detection team, the sale of dogs or the partnering on environmental/ecological surveys.

The ACDN provides a unique opportunity for members to be peer reviewed by other members. This allows for knowledge sharing between teams and are designed to be valuable for both parties. It is at the discretion of the evaluator as to whether they charge for their services.

Whilst these evaluation guidelines are detailed, an experienced detection dog person should assist with these evaluations if they are to be completed by people who are not experienced with this work. The CDD team being evaluated must be consulted throughout this process to ensure the evaluation being designed reflects how this team works and the species they are detecting. Ideally, the evaluator would also have experience working with the target species to ensure targets are being placed in appropriate locations. This is important as how an evaluation is set up

and run will directly impact the data collected and overall results. Where possible, having two CDD experts running the evaluations would be ideal.

Ideally, all evaluations will be video recorded, so if there are any disputes about the performance of behaviours (essential or non-essential) or alerts then video footage can be reviewed.

Reviewing this video footage may also provide a learning opportunity to the dog handler.

Evaluations may also provide the opportunity for organisations who are contracting/employing the CDD team to view how they work, if the CDD team is comfortable with this arrangement.

Evaluation guidelines

Introduction

These evaluations collect data on two very important components of a CDD teams working performance – Section 1: Field safety and welfare and Section 2: Detection performance (i.e. teams search sensitivity and efficiency). The following sections explain how these components are evaluated and outline important considerations for constructing your evaluations and how your data can be collected and reported.

Should you require further clarification or assistance completing these evaluations, please contact the ACDN – contact details are provided at the end of this document.

Evaluation running sheet

The following is an example of how you could design and complete your evaluations. Later sections go into greater detail on important considerations for each stage of the evaluation development and completion. It is important that this process is designed to meet the needs of the specific CDD-handler team and the project, whilst still collecting information that most accurately represents the team's capabilities in a working environment.

Before evaluation

- 1) Dog handler provides evaluator with all relevant and requested safety and welfare documents – such as Risk Assessments, and field safety protocols and equipment.
- 2) Dog handler selects a suitable search evaluation area that resembles the expected work/survey area. It is the handler's responsibility to determine if the CDD team requires permits/approval to work in this area and if this area has been baited. Ideally, target species should not be present to avoid unknown target sample presence. If real (not planted) targets are found in the area during evaluations, these finds must be recorded, however, this will bring into question how many targets have been missed (must be

highlighted in final report). The CDD team should also not have trained/worked in this area previously.

- 3) Dog handler outlines whether search areas should contain a low, medium, or high-density of targets. Evaluator determines how many targets will be placed in each search area. Dog handler also outlines locations within the habitat where target samples should be deposited based on the target species (e.g. base of trees or within grassy tussocks).
- 4) Dog handler to provide evaluator with target, and if required non-target, samples. These samples must be novel (i.e. never exposed to the dog) and will ideally include samples from a variety of individuals, locations/populations, levels of degradation (e.g. fresh and aged samples) and storage methods (e.g. samples contained in different containers – glass jars, plastic containers, metal boxes). Dog handler to also provide evaluator with instructions on how to handle samples (e.g. using sterilised tweezers and gloves).
- 5) Evaluator measures out and sets up search areas. Visual markers (e.g. flagging tape) or GPS technology outlining the perimeter of search areas must be provided.
- 6) Evaluator places out targets in locations accurate of the target species, within defined search area at a time previously agreed with the dog handler (e.g. day before evaluations, if appropriate) and records target locations (ideally with GPS technology and a photograph). The handler is blind to specific number and target locations before and during searches.
- 7) Dog handler notifies the evaluator of the CDDs typical alert behaviour and any non-essential field safety behaviours the CDD team wish to be evaluated.

During evaluation

- 8) On day of evaluation, evaluator shows dog handler the boundaries of each search area prior to the dog entering the area. The dog handler is able to explore the search area to develop a search strategy and risk assessment. Dog handler will determine if there are areas they are not comfortable for the CDD team to work in (e.g. head-height grass during summer). Evaluator is not to disclose any more information about the search area (e.g. the location or number of targets).
- 9) During the evaluation searches, the evaluator records: the total search time for each area; the number of targets located and missed; the number of cues and successful performance of essential and non-essential (if applicable) field safety behaviours; environmental conditions; and whether the dog was wearing a long line for evaluations. The handler is responsible for calling when their dog has performed an alert and located a target, and for

monitoring and managing their team's safety and welfare throughout evaluations (including allowing adequate rest breaks, providing water, scanning for hazards, etc). Both the evaluator and handler can terminate a search, however, if they believe the CDD team safety and welfare is at risk.

Post evaluation

- 10) The evaluator and CDD handler 'pack up' the search areas, including collecting any missed targets and flagging tape on search perimeters.
- 11) If animals and distractions were not encountered during evaluations, additional safety evaluations (outlined in following sections) must be completed.
- 12) Evaluator prepares a summary of all evaluations and any recommendations, and provides this to the CDD team.

Section 1: Field Safety and Welfare

Conservation detection dogs can be trained to perform a variety of behaviours to assist them in the field. These dogs are not obedience dogs, however, their trained behaviours typically have a field-relevant purpose. Behaviours that are important in the field have been separated into essential and non-essential behaviours for the purpose of these evaluations. Essential behaviours must be completed during the evaluations, whilst non-essential behaviours do not have to be included, but the handler can select behaviours from this list, or add and define additional behaviours, that they are likely to use during the evaluation and in the field.

Inevitably, CDD teams work differently and will view different cues and behaviours as essential or non-essential. Rather than assessing teams on behaviours they would personally never use in the field, we have selected essential behaviours that we believe all teams must be fluent in performing to work safely. It is to be decided by the team being evaluated if they want additional cues to be added to this assessment, as they are deemed important or essential for their personal work.

Depending on the search environment and project aims, it may be appropriate for CDD to work on long lines (Lumsden et al. 2022). If long lines are worn during evaluations, this must be recorded on the data sheets and in the final report, as a dog's cue reliability on a long line may not be an accurate representation of their cue reliability off lead.

The purpose of this evaluation component is to: 1) measure the CDD responsiveness to handler cues and the reliability of these cues during a survey in field conditions, where unexpected risks,

vehicles, people, wildlife, livestock or other domestic animals may be encountered; and 2) to review the dog handlers welfare and safety protocols and examine their ability to make real-time decisions around safety (such as monitoring their dog's behaviours during evaluations for signals their dog needs water and rest; recognising safety risks within their environment and creating mitigation strategies) to ensure their team safety and welfare is safeguarded at all times.

Important safety and welfare considerations will be discussed in the next section, followed by the essential and non-essential cues that will be recorded in assessments, and additional safety evaluations.

Safety and welfare standards

CDD welfare must be safeguarded throughout their lives, not only during field deployment. Dog welfare must align with the Five Domains Model of animal welfare (Standards Australia Limited 2022):

1. Access to a nutritional diet and fresh water.
2. Provision of a secured, sheltered rest area.
3. Access to prompt medical services.
4. No ill treatment or mental and physical distress.
5. Access to proper and adequate dog facilities, including exercise space and companionship of other dogs.

Organisations or individuals should have their own welfare and safety guidelines and standards developed, which may include:

- Whole of life plans: A plan must be in place for the dog from their initial sourcing until end-of-life, including: housing, daily husbandry, veterinary and everyday management costs, and retirement/rehoming planning (see Standards Australia Limited 2022). Accurate records should also be kept of each dog, including medical history, training records, and management plan.
- Training standards: Training plans and/or a list of trained behaviours should be made available on request for each CDD team. This will allow for transparency around training practises and experience, as well as highlighting areas where the team can further improve and develop their skills.
- Housing and transportation standards: Dogs must be housed safely and securely, in an enriched environment where their mental, social and physical needs are met (Lumsden et al. 2022; Standards Australia Limited 2022). Dogs also must be transported in a secure and safe manner, such as in crates in a vehicle. Areas where dogs are transported in must be able to be cleaned (e.g. hosed and disinfected) and also be well ventilated. Dogs must be able to stand, sit and lay down in a natural position, and turn around whilst standing when being transported (Standards Australia Limited 2022). Travelling temperature and

environmental conditions must be accounted for to ensure dogs are not at risk, such as from over-heating or exposure, whilst travelling or being contained in a vehicle. It is recommended that dogs have rest intervals every two hours during travel (Standards Australia Limited 2022).

- Safe Work Method Statements (or equivalent) and Risk Assessments (including dog and human members): CDD teams face many risks when working in the field, such as snake bites, bait ingestion, parasites (including ticks), extreme environmental conditions (e.g. heat or electrical storms) or challenging terrain (e.g. boulder fields, thick vegetation). These are just some of the risks that need to be taken into consideration for risk assessments and mitigation strategy development. It is the responsibility of the handler to determine whether an area is safe for their team to work, timing and frequency of breaks and when a search will cease due to safety concerns. Handlers must know where the closest vet clinic is located, and confirm that the clinic provides after hours treatment and stores anti-venom.
- Field deployment protocols: This should include how many days in a row a CDD team can work without having full rest days; average resting times for dogs when working (e.g. 5 minute break after 20 minutes of searching); environmental cut offs which will mean surveys will cease (such as high air temperatures or humidity, high wind speeds, extreme bush fire risk ratings); and plans for monitoring dog welfare in the field (e.g. concerning behaviours). It is crucial that dog handlers are trained and knowledgeable at monitoring dog health in the field, including recognising early warning signs of heat stress or injury, and how to respond to these medical issues.
- Field safety equipment: A variety of field equipment is required for CDD team safety. These may include: high visibility harnesses/jackets (dogs and potentially handlers), GPS hand-held units and GPS tracking collars, emergency communication devices (especially when working in remote areas and/or areas with no phone reception), hard hats, dog booties, first aid kits (human and dog), dog goggles, muzzle (if appropriate), and enough water for all CDD team members. Handlers should also be trained in First Aid.
- Animal Ethics Committee or state permitting approval: Prior to completing these evaluations, or field training and deployment, the CDD team must determine if they require approval to have dogs in the area. This may require written approval or government permits – this will vary depending on the area, activities to be undertaken, and state. Any animals to be involved in research will require Animal Ethics Committee approval.
- Biosecurity protocols: It is important that CDD teams have biosecurity protocols in place to ensure they are not transferring unwanted materials, pathogens, etc, between areas. Before entering and leaving certain areas, for example, it may be appropriate to remove

all organic material and wash the CDD, vehicle and field equipment (including shoes). Biosecurity protocols should be developed in consultation with appropriate land managers. It is also recommended that all dog faeces be removed from the area (Lumsden et al. 2022).

All welfare plans should be tailored to the individual needs of each CDD and team.

During the evaluation process, the evaluator should ask for any protocols that have been developed to review and provide feedback. Similarly, these protocols should be made available to any individual or organisation contracting the CDD team services.

It is the responsibility of the CDD handler to monitor their dogs behaviours and physical state throughout these evaluations. If the evaluator notices concerning behaviours (whether health or behavioural), they must immediately report this to the CDD handler. If the dog continues to display concerning behaviours (that impact either the team or others safety), then both the CDD handler and evaluator have the responsibility to cease the evaluation immediately.

Further considerations for CDD team welfare, monitoring and management can be found in Lumsden et al. (2022), in the *Conservation Detection Dogs* sub-chapter, and general detection dog welfare considerations can be found in Standards Australia Limited (2022).

Evaluation essential behaviours

During all evaluations, the evaluator is to record how many times the handler cues the dog to perform an essential behaviour and how many times the dog correctly responds to that cue (the reliability of these cues will then later be calculated). Ideally, evaluations will be filmed so the footage can be reviewed to confirm the performance of cues and behaviours.

The CDD team must successfully demonstrate each of the following behaviours at least three (3) times during the whole evaluation and have 100% cue reliability. Whilst only the handler is responsible for cueing the CDD, the evaluator may request at any time for the handler to cue the dog to perform an essential behaviour. The handler can, however, delay cueing the behaviour if they believe their dog is almost at their target (i.e. ‘on odour’).

Evaluators are encouraged to request the performance of an essential behaviour when the dog is at a variety of distances from the handler (e.g. 5 m from handler, 25 m from handler, etc), to ensure the behaviour is reliable regardless of the dogs proximity to their handler.

Essential behaviours and their definitions are:

- Recall: Handler gives cue and dog must change gait immediately, return to handler and remain with handler until cued otherwise.

- Emergency stop: Handler gives cue and dog must change gait immediately, stop moving (stand/sit/drop) until rewarded or next cue given.

Ensuring the dog is responsive to handler cues around environmental distractions, including animals, is vital to the safety and effectiveness of this survey method. It is, however, challenging to simulate this during an evaluation. If over the course of the evaluations the CDD team does not encounter any animals, including wildlife, the handler can: 1) complete an additional *simulated safety evaluation* (see below section) around available animals, such as domestic animals or wildlife, and human distractions, such as vehicles, and 2) provide the evaluator with evidence (such as videos) of the dog remaining responsive to essential cues whilst off-leash (or if appropriate, on long lines) around animals and distractions. The evaluator can then provide comments on this in their evaluation summary.

Evaluation non-essential behaviours

The importance of demonstrating these skills depends on the handler, their client/stakeholder and the working environment. The CDD team therefore does not need to perform these behaviours. The team can, however, request the evaluator to also record the amount of time the following behaviours were cued and how many times they were successfully completed. This may help the CDD team determine future areas to improve.

Non-essential behaviours and their definitions may include (CDD team can include and define more behaviours that is relevant to their work):

- Extended stay: Dog to hold stay for x minutes
- Heel: Perform a routine including left & right turn, left & right about face and sit in a heel position (i.e. next to handlers side).
- Directional cues: At normal working distance (i.e. 10-30m), handler gives cues with dog changing gait immediately, then travelling in desired direction.

Simulated safety evaluation

Whilst ideally the dog's cue reliability around wildlife and human distractions (e.g. people, cars or machinery) will be recorded during the detection evaluations, these distractions may not present themselves on the day. Therefore, distractions can be simulated in a separate evaluation in as close to realistic setting as possible, and the dogs cue reliability can be measured here.

It is at the discretion of the dog handler whether the dog is off lead or on a long line during these evaluations. It must be highlighted in the evaluators reports, however, just like with the detection evaluations, if a long line has been used. Cue reliability with a long line on may not reflect cue reliability off lead.

The following describes how these simulated evaluations can be staged:

1) Animal safety evaluation

Dog is off lead or on a long line.

Animals involved in this evaluation have ideally been habituated to dogs (e.g. chickens, guinea pigs or domestic rabbits), to reduce stress. Once the dog is aware of animals, dog must follow all cues from handler (e.g. recall and emergency stop) and not chase, lunge or bark at the animals. Ideally, this will be completed when the animals are both standing still and moving. Evaluator to record number of behaviours cued and number of successfully performed behaviours; the dogs general behaviours around the animals, as well as recording whether the animals were moving or stationary.

If wildlife are available, such as kangaroo or wallaby, repeat the same process as above.

2) Human and human-related safety evaluation

Dog must not be aggressive to humans either in a group situation or one-on-one (e.g. growling, biting or demonstrating stress-related behaviours). Dogs are not to be touched by people in these situations. No requirement to be actively social and engaging with people.

Dog must remain responsive to handler cues when around vehicles/machinery. To ensure dog safety, cars should be driving a maximum of 20km per/hour during this evaluation and remain at least 5 m from the CDD team. Evaluator to record number of behaviours cued and number of successfully performed behaviours, and any attempts to chase vehicles/machinery.

It is important to highlight that animals involved in this evaluation must have their welfare safeguarded and signs of stress must be monitored at all times (e.g. vocalisations, fleeing attempts). Should the animals become stressed by the presence of the CDD team, the evaluation must immediately cease and the dog moved from the area. The state of the animals must be monitored by a nominated person, such as the evaluator, until the animals have returned to displaying normal behaviours.

Section 2: Detection evaluation

Alert behaviours

Alert or indication behaviours are behaviours, typically trained, that a CDD performs once they have located their target. A variety of alert behaviours can be trained and these will likely vary between dog teams. Alert behaviours must be interpretable by the CDD handler.

If detecting live animals, alert behaviours should be passive (e.g. sit and stare) to ensure the target species is not impacted. Active alert behaviours that include barking, pawing or digging, may, however, be deemed appropriate by CDD handlers and land managers on specific projects (e.g. fox den detection).

If detecting biological samples or plants, the alert may be passive or active. As biological samples are valuable and can be fragile, we recommend that all alerts are passive. This increases the likelihood that samples can be further analysed in a laboratory setting. If an active alert is selected, the team must be aware of any negative impact this alert may have on the environment (e.g. if the behaviour is pawing/digging) and surrounding wildlife (e.g. if the behaviour is barking), as discussed with their employers.

Prior to beginning evaluations, the dog handler must state the dog's alert behaviour to be recorded. During evaluations, all alerts will be called by the CDD handler – the evaluator does not need to interpret these behaviours. Depending on the environment and where a target is located, however, this specific behaviour may not be able to be completed. In these circumstances, what is important is the dog handler can read their dog's body language and confidently call an alert.

Survey evaluation design

Survey area

Survey areas must, where possible, mimic the survey environment they will encounter when working in the field to locate the assessed target species. Assessing a CDD team on an open grassed area will not provide valuable or accurate information on their search performance in a complex, dense search environment (Rutter et al. 2021). If CDD teams are assessed in environments atypical of the training and working environment (i.e. complex and dense habitat instead of open grassy plains) the resultant observations may be different, but they should not always be discounted as they may be useful at demonstrating other team dynamics.

The amount of area covered/searched during these evaluations is at the discretion of the team being evaluated. However, the more evaluations completed, the greater the diversity of searches (i.e. habitat complexity, terrain, weather conditions, etc) or the greater the area covered, may provide higher confidence that a team can undertake reliable and accurate searches.

To ensure results are comparable to not only other dog teams, but also to previous years evaluations, we recommend that survey area sizes are as follows:

- 25m x 25m (1/16 hectare)
- 50m x 50m (1/4 hectare)
- 100m x 100m (1 hectare)

Some projects may require intensive surveys of smaller areas (e.g. 1/16 hectare), making this a more appropriate survey scale than 1 hectare. Other projects may require large areas to be surveyed (e.g. many hectares), making several hectare sized searches more appropriate (Baker et al 2021). Alternatively, less experienced teams may select to survey eight 1/8 hectare areas, so their total assessed area is one hectare. This will allow the team to be assessed over multiple sites, but the team can rest in between each search. Importantly, evaluation searches should match the size and environmental complexity of the intended survey areas. If the project requires a survey of several hectares in one day, then having the team evaluated only in a 1/8 hectare area will not provide sufficient evidence of the team's ability.

Wherever possible, evaluation surveys should mimic working requirements for the evaluated team's specific species and field projects. This will likely increase the amount of time dedicated to completing evaluations, but significantly increase confidence in evaluation results and findings. It is acknowledged that there is no single testing protocol to evaluate all search types encountered in CDD work as some will range from highly concentrated, fine-scale detailed searching of smaller grids/areas through to very large open areas. It is not possible to define each possible scenario, but rather provide practical options for each team to demonstrate their ability to complete a search.

Target density

As with the search environment, target density must replicate what would be encountered in the field. For example, if the target species is critically endangered with a large home range, then the search evaluation should be designed with a low target density. This may be zero to four targets per hectare, for example. If the target species is a common species and lives in high density populations, then a high density of targets should be used. This may be 15 or more targets per hectare.

Including blank searches (i.e. searches where no targets are present) in survey evaluations is considered best practise and also mimics real-world working requirements. Blank searches are an excellent way to determine how a CDD team performs in the absence of a target – will the CDD falsely alert? Does the blank search significantly lower the dog's motivation and search intensity? Does a handler influence the dog's behaviour in the absence of targets? Will the team spend longer looking in the absence of a target? Having confidence that a target species is not present in an area, particularly for detection dogs trained to detect rare or pest species, is just as important as having confidence that a team can locate a target species when it is present.

It is crucial that regardless of the target density, the CDD team must not know the quantity, presence or location of any samples.

Important considerations

Target samples

It is best practice in detection dog assessments to use samples that the detection dog has not previously trained on or encountered (Johnen et al. 2017), however, these sample should be collected and stored in a similar manner. This ensures that a detection dog is not simply capable of locating their training targets and has generalised their training to other targets of the same species. As with detection dog training, care must be taken in assessments to ensure target samples are not contaminated. Therefore, when handling samples, assessors should not touch the samples directly, so sterilised tweezers or gloves should be used. Samples must also be stored appropriately, such as in glass or metal jars.

Although ideal, it is not always possible to use a dog's real target (e.g. live endangered species) during evaluations. In these situations, teams can be assessed on another target or surrogate target (if previously trained) or training aid (e.g. cotton swabs of skin from live animals). If placing out artificial training aids, placing out control aids is important (e.g. swabs that have not been in contact with the target). The evaluation target used must be recorded on data sheets. For some field surveys, it is important to know if the detection dogs can generalise from these substitute training aids to the target they intend to find in the field (e.g. live animal). The CDD team's detection sensitivity and efficiency may also vary between training aids and live animals, which must be taken into consideration when reviewing evaluation results.

Dogs are able to easily follow human trails. When assessors are placing targets within the search environment, it is important that an easy scent trail is not left for the dogs to follow straight to the target. Therefore, assessors should walk randomly throughout an area, stopping multiple times in different locations before continuing. This will reduce the likelihood of dogs tracking the assessors. The amount of time a target is within an environment may also influence detectability, so the time the target is within an area before the survey should be recorded. For some target samples and if logistically possible, leaving a target overnight in the search areas may allow for an odour plume to develop. This is important not only to determine the reliability of the dog's performance in locating target odour without assistance, but also in teaching the dog that target odour is not always co-existing with human odour. It can also result in external factors changing the planted target samples (i.e. unknown animals over-scenting the target samples) or removing the targets altogether (i.e. carcasses are taken by predators).

Target locations should be marked on a GPS and photo taken, and at the end of evaluations all samples should be removed from the area.

Environmental conditions

A detection dog team's search can be impacted by the environmental conditions. Dog handler's employ survey strategies that best compensate for the environmental conditions. To ensure that the best representation of a team's performance is captured, environmental conditions should be recorded at the beginning of each search, including wind speed and air temperature. Small hand-held weather meters are available to provide a variety of environmental data in real-time. These devices are not only helpful during evaluations, but also during field surveys.

It is the responsibility of the dog handler to determine how best to approach the search and evaluators may ask about their decision-making, but not provide suggestions.

Data recording and calculations

The performance level required for effective work will vary across project contexts, so this evaluation is not posed as a simple pass-fail assessment with a specific score that a team needs to achieve. Instead, this evaluation provides valuable data on CDD team field safety behaviour/**cue reliability**, detection success (defined as **sensitivity**), **search effort** and **efficiency** in conditions the mimic real-world requirements. What is crucial, regardless of the project, is that the CDD team can work safely in a variety of environments – this is why teams must perform essential safety behaviours with 100% behaviour/cue reliability.

Behaviour/cue reliability calculation (%)

$$\frac{\text{(Number of times behaviour was completed)}}{\text{Number of times behaviour was cued}} \times 100$$

Rather than evaluators scoring dog's behaviours on scale systems (e.g. 1 – 5 grade scales), which are prone to assessor bias and are therefore often subjective, the number of performances of field safety behaviours is reported during evaluations, including the number of times these behaviours were cued but not performed. This provides a more accurate representation of a dog's responsiveness to their handler's cues in a distracting field environment.

Search sensitivity (%)

$$\frac{\text{(Targets located)}}{\text{Total targets available}} \times 100$$

Search sensitivity measures the CDD team's ability to consistently detect all available targets. An appropriate sensitivity score and search effort will depend on the target species, search environment and project aims. For example, if a project requires a high level of confidence that all available targets are detected, then the CDD team should aim for sensitivity scores close to 100%. However, no current detection technology (including detection dogs) can consistently work at 100% detection sensitivity (Greatbatch et al. 2015). It is important to note that higher search efforts will be required for a higher probability of detection and sensitivity (Garrard et al. 2008). Search effort, measured as the time spent searching an area, should therefore be examined in conjunction with sensitivity (Bennett et al. 2020).

Search effort

Total time spent searching / area searched
(e.g. hours per hectare)

This can further be used to calculate search efficiency (Bennett et al. 2020):

Search efficiency

Sensitivity / Search effort

While high sensitivity is generally preferred, assessing a CDD team in terms of search effort and search efficiency enables the project team to estimate the time and resources required to complete a task to a desired standard. This is especially useful when comparing CDD teams to each other, and to alternative survey methods. It is possible that a single survey method is preferred in all cases, but also common for multiple CDD teams and/or survey methods to each be preferred under different conditions (e.g. different search terrains or target forms). Multiple CDD teams and other survey methods can potentially work in combination to achieve the best project outcomes.

Search time must be recorded, from when the team starts their search, until the handler declares that they have sufficiently covered their search area. Handheld GPS systems and collars can be used during evaluations to monitor area coverage, as is common place in the field. It can be useful to pause search time or note the timing of transitions between active search and other activities, such as reward and rest times. The total time gives an indication of the resourcing

needed to conduct a safe search with a well-rested dog. The active search time (i.e. reward and rest times subtracted) can offer a relevant measure of the dog's detection performance when more sophisticated data analyses are planned. For example, survival analysis can measure changes in detection rate through time and therefore focuses on the time periods where the search team is exposed to targets through active search activity (e.g. Hauser et al. 2022). This approach also requires recording of the time taken from beginning the search to locating each target.

Data sheets and documentation

It is the responsibility of the evaluated CDD team to store all collected data to be provided to employers, clients and stakeholders upon request. Below is an example of a data sheet that could be used by the evaluator to record information during evaluations. This datasheet has been filled in with example results (simulated data). An example of how the data could be summarised and provided to both the evaluated CDD team and future collaborators/ employers is also provided. Blank data sheets and summary certificates can be found in the Appendices.

Conservation detection dog team evaluation datasheet

Evaluator	Charli Simpson	Dog handler	Jane Dreamer	CDD name	Frank
Target	Tasmanian tiger scat	Date	12/12/2022	Location	Warburton

SEARCH AREA 1					
Search size	1 hectare (100 m x 100 m)	Habitat type	Box-ironbark woodland	No. targets	3
Weather	Cloudy	Wind speed	15km/h	Air temperature	14 degrees
Start time	6:20am	Finish time	7:00am	Total search time	40 min
Targets found	3	False alerts	0	Targets missed	0
Essential behaviours	No. times behaviour cued	Behaviour performed	Non-essential behaviours	No. times behaviour cued	Behaviour performed
Recall	4	4	Direction change	10	10
Stop	2	2			
Evaluator comments: CDD team covered area thoroughly. Frank was very responsive to cues, including around a mob of kangaroos. Performed his sit alert on all targets. Long line not used.					

SEARCH AREA 2					
Search size	1 hectare (100 m x 100 m)	Habitat type	Dense alpine heath	No. targets	0 (blank search)
Weather	Cloudy	Wind speed	7km/h	Air temperature	16 degrees
Start time	7:30am	Finish time	8:45am	Total search time	75 min
Targets found	0	False alerts	1	Targets missed	0
Essential behaviours	No. times behaviour cued	Behaviour performed	Non-essential behaviours	No. times behaviour cued	Behaviour performed
Recall	2	1	Direction change	13	12
Stop	2	1			
Evaluator comments: CDD team covered area very thoroughly and spent a lot longer searching area than previous site. As search continued with no finds, Frank started becoming distracted, smelling dragon and unicorn scat – ignored recall at this time. Frank also did not respond to one stop cue when he was at a large distance from handler – <u>long line was put on after ignoring this cue</u> . Frank completed one false alert near end of search on common pickle-weasel scat.					

Evaluation summary

Evaluator	Charli Simpson	Dog handler	Jane Dreamer	CDD name	Frank
Target	Tasmanian tiger scat	Date	12/12/2022	Location	Warburton

Total false alerts	1	Total search time	115 mins	Total area searched	2 hectares
Search sensitivity	100%	Search effort	57.5 mins per hectare	Search area sizes	1 hectare areas
	Emergency recall	Emergency stop			
Cue reliability	83%	75%			

Evaluator comments	Jane provided well detailed and thorough safety and welfare protocols, and their biosecurity practices were particularly extensive. Jane also had all required field safety equipment for all evaluations. Jane and her CDD, Frank, performed well across evaluations, scoring 100% search sensitivity. Whilst Frank did demonstrate good behaviours around a mob of kangaroos, the reliability of Frank's emergency cues was concerning and they did not achieve 100% reliability. I would therefore recommend prioritising Frank's responsiveness around distractions, including safety cue reliability, to ensure they are safe in the field.
Evaluator signature	<i>C. Simpson</i>

Evaluation frequency

The ACDN has no formal requirements for how frequently these evaluations be completed and whether evaluations need to be completed for every dog-handler team combination (e.g. one dog can be handled by more than one person within an organisation). The frequency of these evaluations is at the discretion of the team and the requirements of their employers and working partners.

Completing these evaluations annually, however, would be beneficial when quantifying the progression of the detection teams and would be valuable supporting data for team competency.

ACDN Contact information

The Australasian Conservation Dog Network can be contacted at contact@conservationdognetwork.com.au

If you are interested in becoming an ACDN member or want to employ/contact conservation detection teams, please visit our website: www.conservationdognetwork.com.au

References

- Baker, GB, Candy, S, Robinson, S, Friend, JA, Holdsworth, M, Jensz, K, Page, M, Algar, D 2021, 'Effectiveness of dogs for detecting feral cat scats in wheatbelt reserves of Western Australia', *Wildlife Research*, vol. 48, pp. 690-700. <https://doi.org/10.1071/WR20118>
- Bennett, EM, Hauser, CE & Moore, JL 2020, 'Evaluating conservation dogs in the search for rare species', *Conservation Biology*, vol. 34, pp. 314-325. <https://doi.org/10.1111/cobi.13431>
- Garrard, GE, Bekessy, SA, McCarthy, MA & Wintle, BA 2008, 'When have we looked hard enough? A novel method for setting minimum survey effort protocols for flora surveys', *Austral Ecology*, vol. 33, pp. 986-998. <https://doi.org/10.1111/j.1442-9993.2008.01869.x>
- Greatbatch, I, Gosling, R & Allen, S 2015, 'Quantifying Search Dog Effectiveness in a Terrestrial Search and Rescue Environment', *Wilderness & Environmental Medicine*, vol. 26, pp. 327-334.
- Hauser, C.E., Giljohann, K.M., McCarthy, M.A., Garrard, G.E., Robinson, A.P., Williams, N.S.G. & Moore, J.L. 2022, 'A field experiment characterizing variable detection rates during plant surveys', *Conservation Biology*, vol. 36, e13888. <https://doi.org/10.1111/cobi.13888>
- Johnen, D, Heuwieser, W & Fischer-Tenhagen, C 2017, 'An approach to identify bias in scent detection dog testing', *Applied Animal Behaviour Science*, vol. 189, pp. 1-12. <https://doi.org/10.1016/j.applanim.2017.01.001>

Lumsden, LF, Waudby, HP, Meek, PD, Crisp, HA, Cripps, JK, Cristescu, R, Jamieson, L, Nelson, JL, Teixeira, D, Hodgins, N, Rutter, N, Morratt, DS, Bower, DS, Dickman, CR & Soennichsen, K 2022, 'Detecting and monitoring wildlife remotely', in *Wildlife Research in Australia*, B Smith, H Waudby, C Alberthsen & J Hampton (eds), CSIRO Publishing, pp. 75-95.

Rutter, NJ, Howell, TJ, Stukas, AA, Pascoe, JH & Bennett, PC 2021, 'Diving in Nose First: The Influence of Unfamiliar Search Scale and Environmental Context on the Search performance of Volunteer Conservation Detection Dog-Handler Teams, *Animals*, vol. 11, pp. 1177-1197.
<https://doi.org/10.3390/ani11041177>

Standards Australia Limited 2022, *Privately contracted security and detection dogs – Part 1: Acquisition, welfare, training, deployment and retirement*, Sydney, Australia. Available at: [as-5350-1-2022 | Standards Australia](#)

Appendices

Blank examples of data sheets and evaluation summaries are on the following pages.

Conservation detection dog team evaluation datasheet

Evaluator		Dog handler		CDD name	
Target		Date		Location	

SEARCH AREA 1					
Search size		Habitat type		No. targets	
Weather		Wind speed		Air temperature	
Start time		Finish time		Total search time	
Targets found		False alerts		Targets missed	
Essential behaviours	No. times behaviour cued	Behaviour performed	Non-essential behaviours	No. times behaviour cued	Behaviour performed
Recall					
Stop					
Evaluator comments:					

SEARCH AREA 2					
Search size		Habitat type		No. targets	
Weather		Wind speed		Air temperature	
Start time		Finish time		Total search time	
Targets found		False alerts		Targets missed	
Essential behaviours	No. times behaviour cued	Behaviour performed	Non-essential behaviours	No. times behaviour cued	Behaviour performed
Recall					
Stop					
Evaluator comments:					

Evaluation summary

Evaluator		Dog handler		CDD name	
Target		Date		Location	

Search sensitivity		Search effort		Search area sizes	
Total false alerts		Total search time		Total area searched	
	Emergency stop	Emergency recall			
Cue reliability					

Evaluator comments	
Evaluator signature	