Kroombit tinkerfrog: assessing the feasibility of a scent detection dog.

Improving detectability of a critically endangered frog.

Australian Government

Queensland Government

Prepared by: Ecological Services and Threatened Species Operations of the Department of the Environment, Tourism, Science and Innovation, Canines for Wildlife and Currumbin Wildlife Sanctuary.

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August 2025

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Kroombit tinkerfrog recovery program

The Kroombit tinkerfrog (*Taudactylus pleione*) is a critically endangered species that only occurs in a small area in the eastern uplands of Kroombit Tops National (KTNP), south-east Queensland. Biogeographically, KTNP is a sky island – an isolated cool and wet upland area surrounded by much hotter and drier lowlands. As such many species of plants and animals are at the northern limit of their distribution or have significant disjunct populations at KTNP (Hines 2014).

Due to its unique intrinsic natural values, management of KTNP is a high priority under Queensland Parks and Wildlife Service's (QPWS) Values Based Management Framework (VBMF) (DETSI 2025b). Under the VBMF the Kroombit tinkerfrog is identified as a Natural Key Value, as it is a unique and irreplaceable value of KTNP. Furthermore, recent assessments have identified the Kroombit tinkerfrog as amongst Australia's most imperilled wildlife and a national priority for research and management (Gillespie *et al.* 2020; Geyle *et al.* 2021). A Recovery Action Plan that provides the strategic management direction for the recovery of the species was recently developed (Queensland Government 2025).

In 2022 the Kroombit tinkerfrog was one of six frogs included in the federal government's 100 priority threatened species (DCCEEW 2022). In 2024 QPWS received a Saving Native Species Grants (Priority Species) from the federal government to support the Kroombit tinkerfrog recovery program. A key component of this grant, reported herein, was an evaluation of the efficacy of scent detection dogs to improve detectability of Kroombit tinkerfrogs, to enhance recovery actions such as captive breeding and translocations.

Detection dog project background

Using scent detection dogs (detection dogs) for conservation management is well established and documented in 62 countries for over 480 species across a range of taxa, including mammals, birds, reptiles, amphibians, insects, molluscs, fungi, bacteria and plants, in a range of terrestrial and aquatic environments (McKeague *et al.* 2024). In Queensland, detection dogs have been used to locate species such as northern quoll (*Dasyurus hallucatus*) (Jamieson *et al.* 2021), silver-headed antechinus (*Antechinus argentus*) (Baker *et al.* 2021) and black-tailed dusky antechinus (*A. arktos*) (NESP 2019; NESP 2021). In Australia detection dogs have been used for amphibians in the case of the critically endangered Baw Baw frog (*Philoria frosti*) (Gilbert *et al.* 2024) and to locate and prevent cane toad (*Rhinella marina*) establishment on Moreton Island (Tingley *et al.* 2019). The objective of the project reported upon herein was to assess the feasibility of using detection dogs in finding non-calling individuals of the critically endangered Kroombit tinkerfrog (*Taudactylus pleione*), to support several recovery actions.

While adult male Kroombit tinkerfrogs are readily detectable when calling, juveniles and females are highly cryptic and very rarely observed, and eggs and tadpoles have never been observed in the wild. If successful, detection dogs provide a complementary tool to assist with locating frogs for genetic rescue and inclusion within the captive breeding program, monitoring success of translocations and provide increased confidence when assessing absence from sites where the species is thought to be extirpated.

Following a tendering process, Canines for Wildlife were chosen to design, train and test the feasibility of detection dogs for the project (Plate 1). Canines for Wildlife have effectively worked

with conservation detection dogs on threatened species over a 10-year period, including work previously at Kroombit Tops National Park (hereafter KTNP).

This project was a collaborative partnership between Queensland Parks and Wildlife Service (QPWS&P) (within the Department of the Environment, Tourism, Science and Innovation), Canines for Wildlife and Currumbin Wildlife Sanctuary (CWS) and funded through the Australian Government's Saving Native Species Program.

The aim of this project was to determine whether detection dogs can be imprinted on the odour of Kroombit tinkerfrogs and detect non-calling Kroombit tinkerfrogs in the wild.

The project used a phased/staged approach to train a detection dog and assess the feasibility through a number of trials. Stage one involved the collection of odour and odour trials in a controlled environment and stage two involved field trials at KTNP in areas known to support KTF and those where KTF are absent. This report outlines the considerations and approvals required to utilise detection dogs on Queensland's protected areas and documents the methods used to collect odour, train a detection dog and assess efficacy in controlled environments and within the difficult terrain that Kroombit tinkerfrogs inhabit in the wild.

Detection dogs on QPWS managed areas

All work with detection dogs on QPWS protected areas must adhere to the practices outlined in the draft *Managing scent detector dogs on QPWS managed areas, procedural guide* (DETSI 2025a). The purpose of the guide is to inform departmental staff and key stakeholders on the process for assessing risk, determining conditions of use and the approval process for using detection dogs on QPWS managed areas.

The use of detection dogs on QPWS managed areas comes with potential risks to native species and ecosystems, to the dogs and their handlers, and to the department. Appropriate planning, approvals and management processes are required to ensure the use of detection dogs achieves desired conservation outcomes while minimising these risks.

Particular attention is required around the timing and location of 1080 baiting activities, which pose a potentially catastrophic risk to dogs. Baits may remain active for prolonged periods following placement in the field and as such, Canines for Wildlife required at least a six-week interval between any baiting and the use of detection dogs in an area. For the field trails during this project multiple discussions were held with relevant senior park managers to ensure this condition was strictly adhered to.

Canines for Wildlife detection dogs are trained to avoid negative interactions with wildlife (e.g. not to chase, snake awareness and avoidance). When working, the dogs wear a special harness to reduce the risk of injury and snake bite. The harness also contains a GPS tracking system that communicates the location of the dog to the handler (in the unlikely case the handler and dog become separated) and enables the search area to be mapped. Apart from when working the detection dog was on a lead under the control of a handler. Whilst working, the handler remained in close contact with the dog (Plates 6-9) and used voice and whistle commands to control the dog. All dog faecal matter was collected and removed from QPWS estate.

QPWS staff were responsible for navigating to and from training and survey sites, ensuring appropriate health and safety considerations were in place (principally via the *Kroombit Tops Frog Search Emergency Procedures*), and supervising all aspects of the detection dog work on protected areas to ensure approval conditions were met. There were no concerns regarding the

use of the detection dog on QPWS estate during this project. The project team would like to acknowledge the assistance of the local QPWS staff in ensuring the planning of 1080 baiting around the detection dog work and providing accommodation and related facilities at KTNP.

Training and feasibility trials

The stages of the feasibility trials are documented below and include key successes, whether the training was effective and desired outcomes were achieved.

Certified detection dog Ash was chosen for the training (Plate 2). Ash is a working line English springer spaniel and has previously been successfully trained to detect Hastings River mouse (*Pseudomys oralis*), silver-headed and black-tailed dusky antechinus. All work with detection dogs on QPWS protected areas must adhere to the practices outlined in *Managing scent detector dogs on QPWS managed areas, procedural guide*.

Stage one – controlled trials

Odour collection

Odour samples for dog training were collected from captive and wild Kroombit tinkerfrogs. The technique was refined using captive-bred individuals Currumbin Wildlife Sanctuary (Plate 3) on 22 December 2024, and relied on skin swabbing, retaining holding bags and the use of Mylar bags and blank Getxent tube (https://getxent.com/). From this a protocol and associated training video was developed to guide collection of odour from wild frogs (see Appendix 1 Kroombit tinkerfrog detection dog odour sampling protocol) at KTNP (Plate 4) on 13-14 January 2025. Odour samples were transported and stored at or below 4°C at the Canines for Wildlife training facility.

Odour based training, December 2024 to May 2025.

The detection dog, Ash, was trained by Lynn Baker on captive and wild caught Kroombit tinkerfrog odour samples from multiple male, female and juvenile individuals at the Canines for Wildlife facility from December 2024 to May 2025. This included imprinting on odour in clean training areas to searches and double-blind finds in natural environments at the Canines for Wildlife facility (Plate 5).

Outcome: Training was effective, and the detection dog was able to locate odour samples.

Introduction of captively bred Kroombit tinkerfrogs, January 2025.

To determine whether detection dogs can be imprinted on the odour of captively bred Kroombit tinkerfrogs, the detection dog was introduced to selected individuals in a secure indoor environment at Currumbin Wildlife Sanctuary on 21 January 2025 (Plate 6). Training sessions were completed to teach the detection dog to 'select' captive frogs. Captive frogs were kept in secure clear Perspex containers with air holes which allowed the dog to see and smell the frogs whilst maintaining frog safety and hygiene.

Outcome: Training was effective, and the detection dog was able to locate captive Kroombit tinkerfrogs.

Double-blind odour and frog field trials, April 2025.

Double blind trials (where both dog and handler do not know the location of the target placement) were conducted with the detection dog in montane forest at Springbrook National Park over the period 4-6 April 2025. The aim was to validate the dog's ability to detect live captively bred Kroombit tinkerfrogs and the odour collected from wild individuals, in structurally complex forest habitat, with an odour background likely similar to that at KTNP. Controlled field trials were located off Carricks Road, Springbrook National Park (Plate 7) and adhered to the procedures outlined in *Managing scent detector dogs on QPWS managed areas, procedural guide*. Captively bred Kroombit tinkerfrogs were kept in secure clear Perspex containers with air holes. This allowed the containers to be hidden amongst the vegetation and emit odour, whilst maintaining frog safety and biosecurity.

Outcome: The detection dog was successfully able to track the source of the odour in all instances and located both the captive Kroombit tinkerfrogs and wild odour, thereby completing stage one and allowing progression to the second stage of field trials.

Summary of controlled trials: The successful completion of this stage demonstrated that detection dogs can be imprinted on the odour of Kroombit tinkerfrog using odour collected from captively bred and wild individuals; and effectively detect odour and live captively bred Kroombit tinkerfrogs in indoor and outdoor environments.

Stage two – Field trials at KTNP May 2025

Field training of the detection dog was timed to coincide with a release of captively bred Kroombit tinkerfrogs at KTNP between 9-15 May 2025. Controlled field trials were conducted using captively bred individuals and odour collected from wild individuals.

Presence of wild odour, non-Kroombit tinkerfrog habitat

The detection dog was initially run on previously collected odour from wild Kroombit tinkerfrogs in habitat known not to support the species.

Outcome: The detection dog successfully located the source odour in all instances, with no false-positive detections.

Presence of wild odour in leaf litter with captively bred individuals

Rainforest leaf litter was collected from an area known to support several Kroombit tinkerfrogs at site TP030 and placed in containers with four captively bred frogs for 24 hours, to broaden the odour training profile to include odour present in wild tinkerfrog habitat with captive Kroombit tinkerfrogs. The detection dog was run on these frogs at Griffiths Creek and Palm Gully in rainforest habitat known not to contain wild populations of Kroombit tinkerfrogs. As previously, captive Kroombit tinkerfrogs were kept in secure clear Perspex containers with air holes which allowed the containers to be hidden amongst the vegetation, allowing the dog to smell Kroombit tinkerfrogs whilst maintaining frog safety and hygiene.

Outcome: The detection dog was successfully able to detect the captive bred Kroombit tinkerfrogs with blended wild odour in habitat known not to contain wild Kroombit tinkerfrogs, allowing field trials to progress to the next step.

The detection dog was run on the same captive bred Kroombit tinkerfrogs with blended odour in rainforest habitat known to contain a wild population of Kroombit tinkerfrogs at site TP030.

Outcome: Once again, the detection dog successfully detected the location of the hidden frogs, , with no false-positive detections. Field trials progressed to the next step.

Presence of captively bred Kroombit tinkerfrogs at translocation sites

Captively bred Kroombit tinkerfrogs were released in the evening within rainforest habitat at release site TP041, a site where a translocated population of Kroombit tinkerfrogs is being established. The locations of individual release points were carefully noted. The following day, the detection dog was run within the release area, and it successfully detected at release points, , with no false-positive detections. This procedure was repeated at a second Kroombit tinkerfrog release site (TP014), which contains an augmented wild population of Kroombit tinkerfrogs (Plate 8, Plate 9 and Plate 10). Again, the detection dog made several positive indications.

Outcome: The successful completion of this stage demonstrated that detection dogs were effective at detecting captively bred and wild Kroombit tinkerfrog odour as well as live captively bred individuals in complex rainforest habitat, at presence and absence sites of wild populations of Kroombit tinkerfrogs.

Site previously known to support Kroombit tinkerfrogs in 2018

Towards the end of the field trials at KTNP it was apparent that the detection dog Ash was fully trained. As training and field validation progressed faster than anticipated, a run was undertaken at a site male Kroombit tinkerfrogs had not been detected calling via the automated acoustic monitoring program since May 2018 (site TP059). The aim was to assess the site for the presence of Kroombit tinkerfrogs, with the potential for obtaining individuals for the captive breeding program (genetic rescue).

Outcome: Remarkably the detection dog made several repeat positive indications of the presence of Kroombit tinkerfrog at a very specific location within the site. The source of the detection was an area of complex rocky scree and flood debris, typical of microhabitat where tinkerfrogs have been observed. The frog team carefully searched through the substrate but did not sight any tinkerfrogs. As this search was undertaken during daylight, and the habitat was highly complex, the likelihood of observing a tinkerfrog was low, based on experience. As this detection was on the last day of the field trip, follow-up surveys could not be undertaken.

Feasibility assessment and summary

The successful completion of feasibility trials indicates the use of detection dogs is a realistic and practical technique for supporting conservation management of the critically endangered Kroombit tinkerfrog, within the complex, steep and rocky rainforest habitat at KTNP.

Detection dogs could become a vital and efficient technique to locate non-calling Kroombit tinkerfrogs, especially females at sites where males have long been extirpated, for genetic rescue. The use of detection dogs complements existing monitoring and survey methods that rely on the calls of males.

Future field work could include additional sites where calling male Kroombit tinkerfrogs have not been heard recently, for genetic rescue or for the targeted collection of females to bolster genetic diversity for the captive breeding program. Detection dogs could also be used to assess the survivorship and movement and survivorship of non-calling captively released frogs at reintroduction sites.

The detection of Kroombit tinkerfrog odour at site TP059, provides very strong evidence of the likely persistence of a non-calling individual at a location where males where routinely detected calling up until 2018. It is highly feasible that a long-lived female Kroombit tinkerfrog remains at this site and should be targeted for genetic rescue.

Plate 1. Canines for Wildlife team. Left: detection dog Ash with Jack Nesbitt (left) and Lynn Baker (right) at Springbrook National Park, April 2025. © Carly Bishop. Right: Ash with Jack Nesbitt (left) and Brad Nesbitt (right) at Kroombit Tops National Park, May 2025. © Sean Curran CWS.

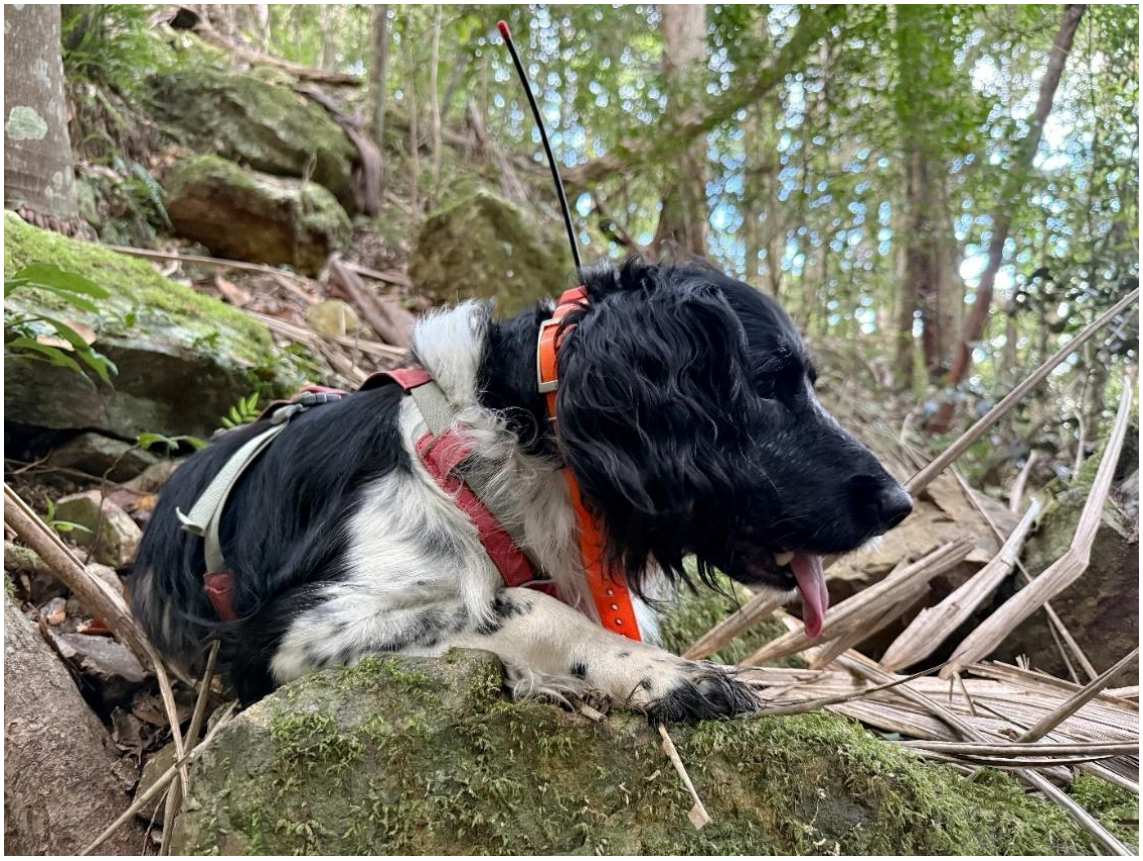


Plate 2. Canines for Wildlife detection dog, Ash, at Kroombit Tops National Park, May 2025. © Brad Nesbit CfW.

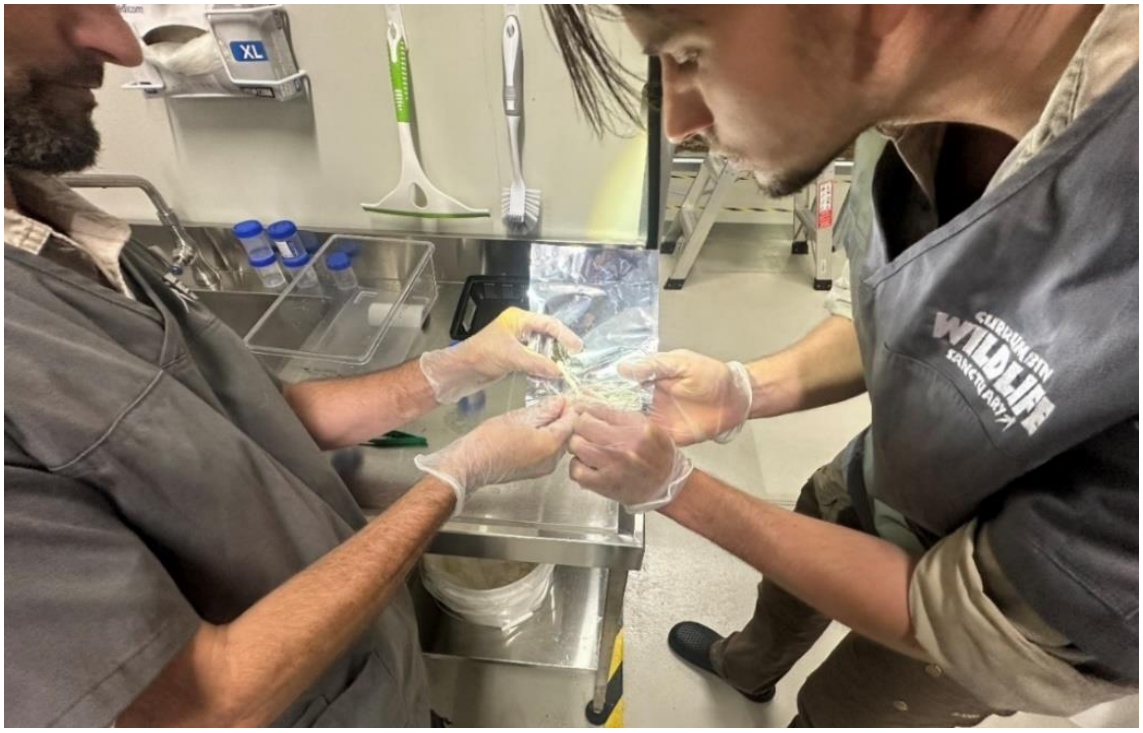
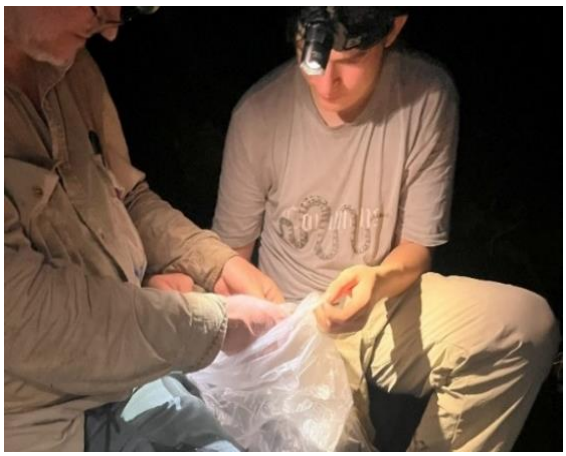


Plate 3. Michael Vella (left) and Jack Nesbitt (right) swabbing a captively bred Kroombit tinkerfrog in the Frog Lab at Currumbin Wildlife Sanctuary. Odour samples were collected by swabbing the frog and through transfer to the Mylar bag used to hold the frog during swabbing.
December 2024, © Michael Vella CWS.



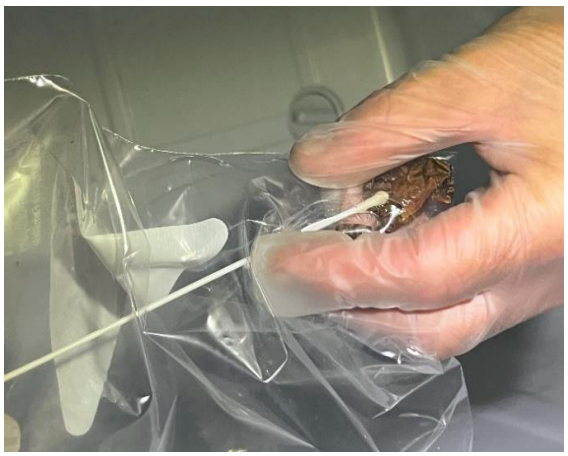


Plate 4. Swabbing a male Kroombit tinkerfrog for odour in the field.
Left: swabbing was undertaken within a large clean plastic bag to contain the frog should it escape from the Mylar bag. Harry Hines (left) is restraining and swabbing the frog within the Mylar bag, whilst Finan Cochran (right) provides additional illumination and holds open the precautionary spill bag.
Right: the frog was captured using a small clean freezer bag and then transferred to a clean Mylar bag for odour collection. As in the Frog Lab odour samples were collected by swabbing the frog and through transfer to the Mylar bag used to hold the frog during swabbing. As Kroombit tinkerfrogs are highly sensitive to heat transfer, the individual was coaxed into the corner of the bag so it could be constrained by pulling the Mylar tight without holding the frog.
13 January 2025 © Gemma Blashak DETSI.

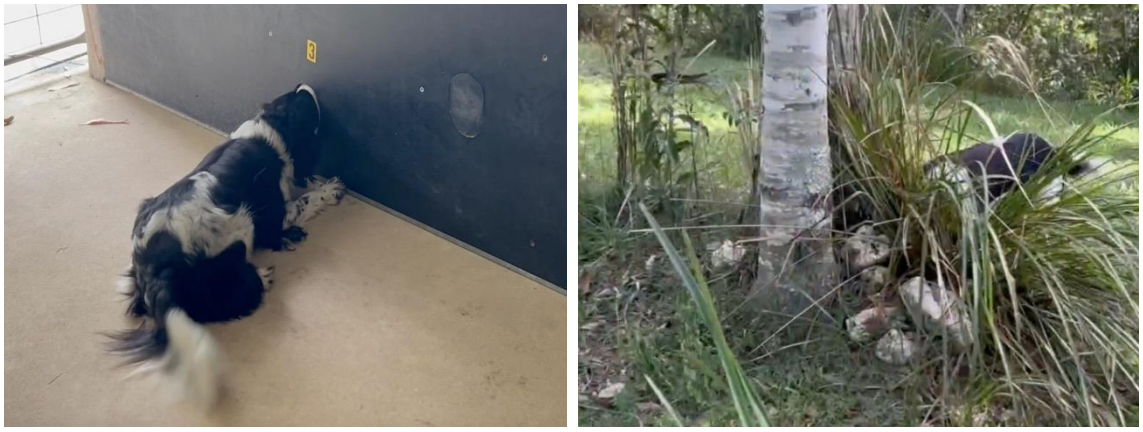


Plate 5. Odour training at the Canines for Wildlife Training Facility. Left: Ash is being trained on swabs impregnated with captive male Kroombit tinkerfrog odour, January 2025. Right: Ash is being trained on a swab impregnated with wild Kroombit tinkerfrog odour hidden in a rock pile outside, February 2025. L. Baker CfW.

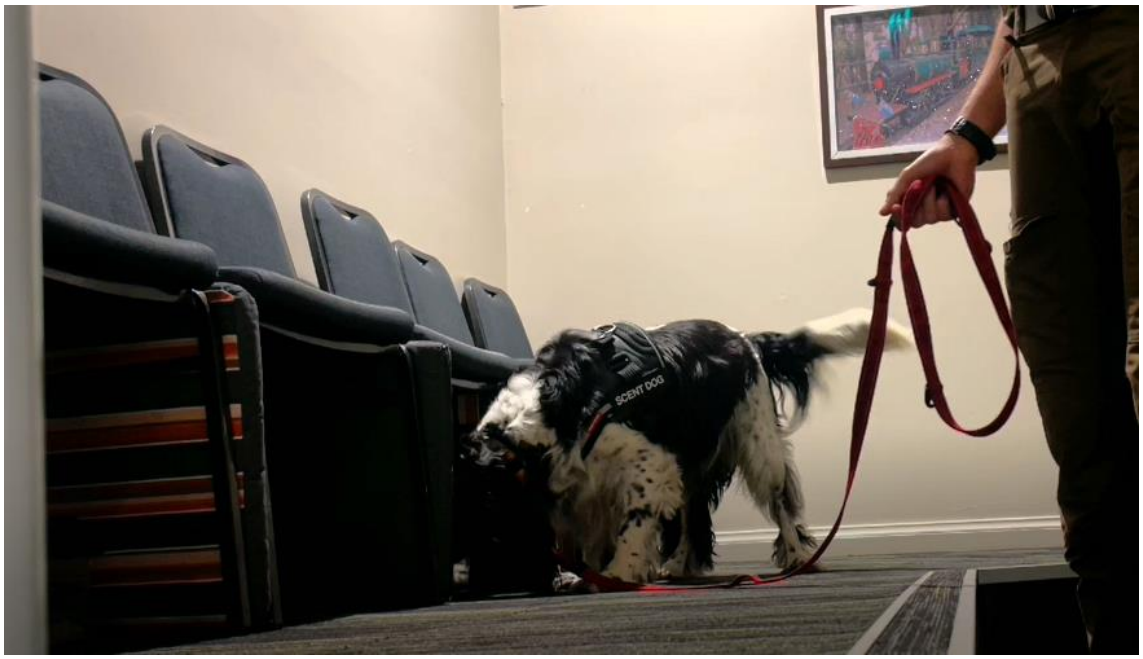


Plate 6. A training session with detection dog Ash at Currumbin Wildlife Sanctuary. Selected captive frogs were kept in secure clear Perspex containers with air holes and hidden in secure indoor environments, January 2025. © Michael Vella CWS.

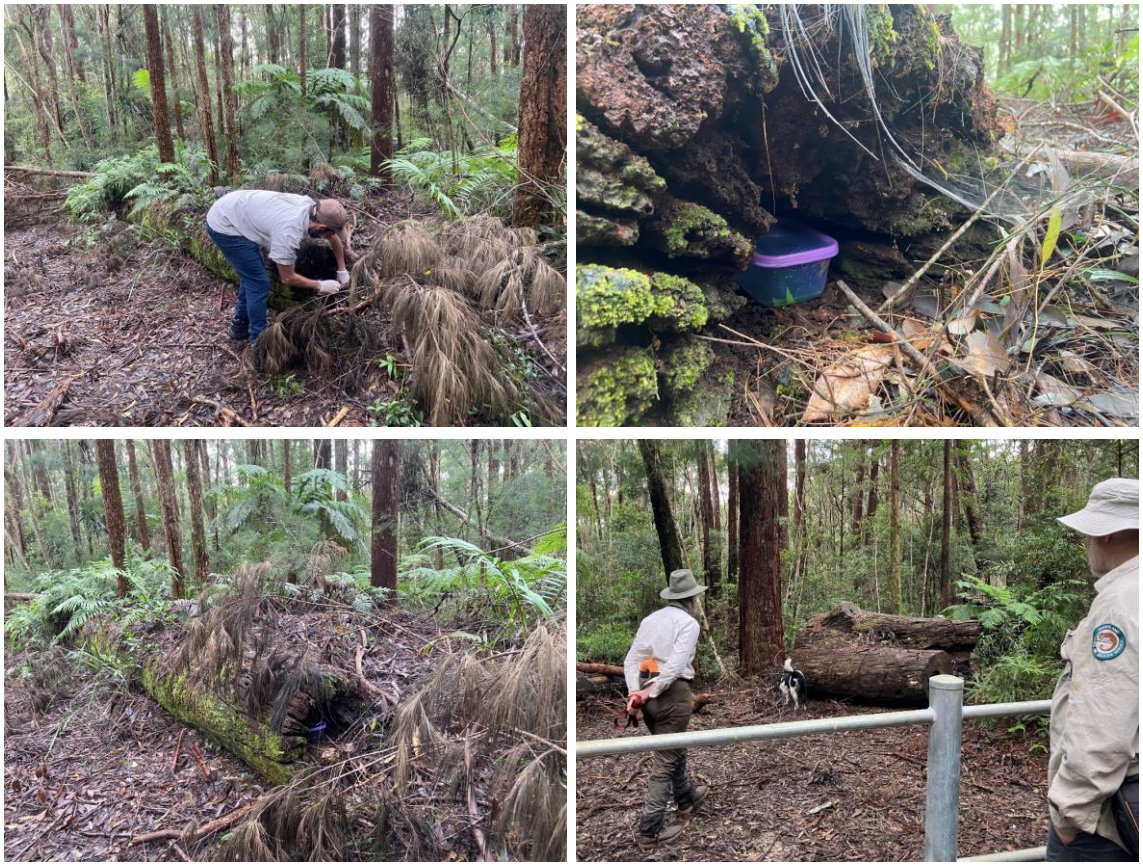


Plate 7. Double blind trials for detection dog Ash in the field at Springbrook National Park.
Top left: Michael Vella hides a contained, captively bred Kroombit tinkerfrog inside a decaying log.
Top right and bottom left: the location of the ventilated container holding a captive Kroombit tinkerfrog which was then concealed with adjacent leaf litter.
Bottom right: detection dog Ash in action as he locates the target with handler Lynn Baker (left) and Harry Hines (right).
4 April 2025 © Carly Bishop and Clare Hourigan DETSI.

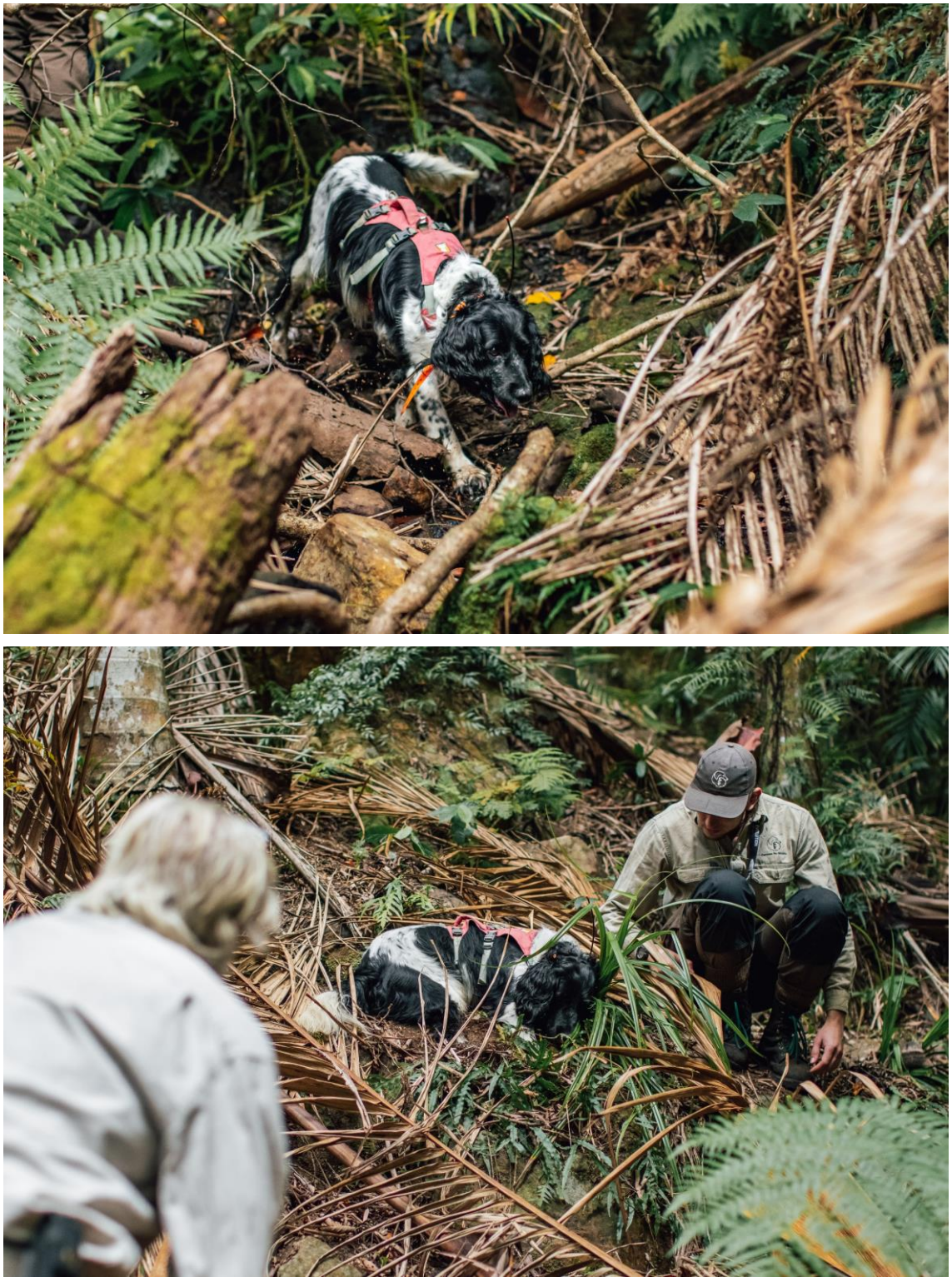


Plate 8. Double blind field trials at Kroombit tinkerfrog site TP014 at Kroombit Tops National Park. Top: Ash at work amongst the palm fronds searching for the target.
Bottom: Jack Nesbitt (right) with Ash while Brad Nesbitt observes. A positive indication is made by Ash at this location upon detecting Kroombit tinkerfrog odour in the undergrowth.
13 May 2025, © Sean Curran CWS.

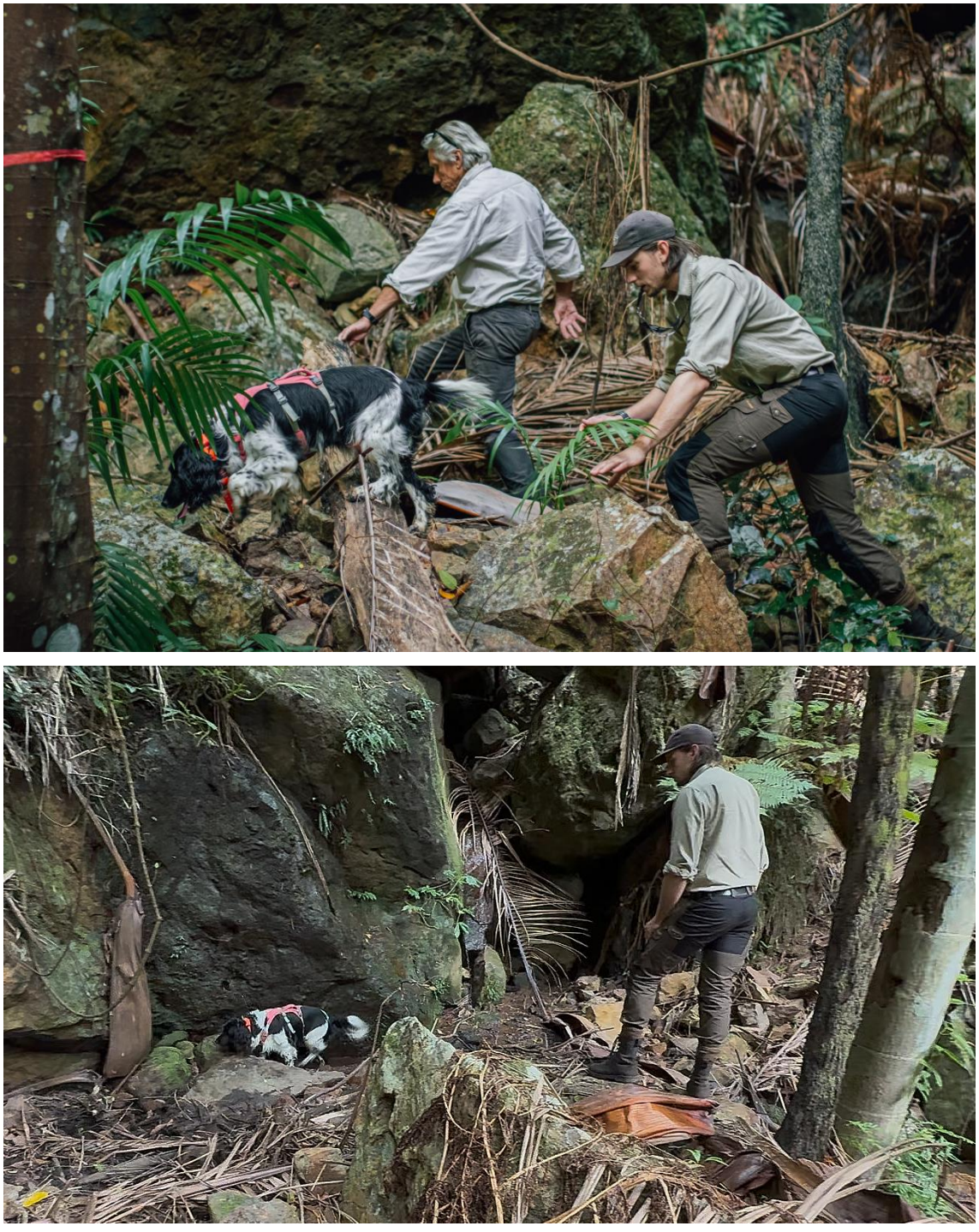


Plate 9. Double blind field trials at Kroombit tinkerfrog site TP014 at Kroombit Tops National Park, 13 May 2025. Top: Detection dog, Ash at work amongst the rocks with handlers Jack and Brad Nesbitt. © Sean Curran CWS. Bottom: Ash works at the bottom of a waterfall with handler Jack Nesbitt. © Brad Nesbitt CfW.

Plate 10. These images demonstrate the steep, rocky complexity of Kroombit tinkerfrog site TP014 at Kroombit Tops National Park, Queensland. This complexity is typical of the rainforest gullies inhabited by the species. Top: Hunter McCall with Ash atop a boulder, handler Jack Nesbitt (right) and Brad Nesbit (left). Bottom: Ash at work in the complex rainforest habitat of the site, with Jack Nesbitt, Canines for Wildlife. 13 May 2025 © Sean Curran CWS.

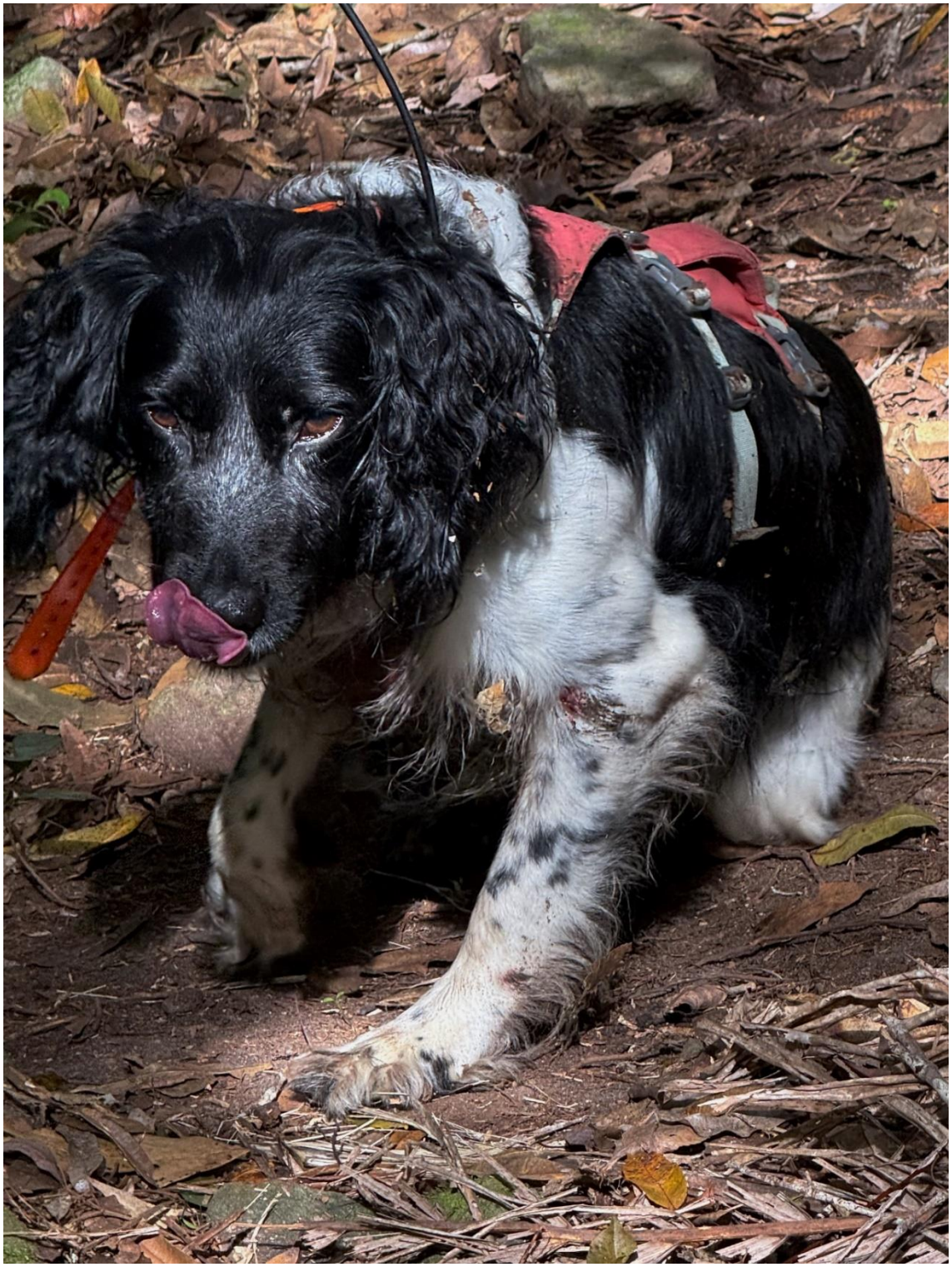


Plate 11. Canines for Wildlife detection dog Ash, at work. Kroombit Tops National Park, May 2025. Photo © Brad Nesbitt CfW.

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Appendix 1: Kroombit tinkerfrog detection dog odour sampling protocol

10 January 2025

Equipment needed

- Esky and cold bricks
- Clean, powder free gloves
- Clean tweezers
- Single use catch bags
- Mylar bags
- Cotton swabs
- Gauze pads
- Marking pens
- Blank Getxent tubes
- Clean buckets with lids

Field sample collection protocol

1. Transfer captured Kroombit tinkerfrog to a clean Mylar bag.
2. Wrap gauze around cue tip (as per Micheal Vella's tutorial video).
3. Swab frog with gauze focusing on wet areas and leg/arm pits.
4. Release the frog.
5. Place the gauze swab and cue tip in the Mylar bag.
6. Add one blank Getxent tube (https://getxent.com/) with tweezers to the Mylar bag (ensure that the bag containing the blank Getxent tubes is open for as little as possible to avoid contamination with environmental odours).
7. Label the Mylar bag with a unique identifier for the frog, its gender, age, and location.
8. Retain any capture bags, gloves or other material that was been in contact with the frog, label as above.
9. Place a pair of unused gloves from the box in a Mylar bag to use as control.
10. Keep the samples cool in an esky until refrigeration is available.
11. Store and transport under refrigeration.

Control odour collection

Collect sample of soil and gravel in habitat not occupied by Kroombit tinkerfrog in clean buckets with lids. Keep cool.

Appendix 2: Public communications and social media

Arising directly from the detection dog project

Dogs sniffing out threatened frogs? Yep, it's a Queensland first! 🐕 For the first time in Queensland, conservation detection dogs are being used to... | By Queensland Environment | Facebook

https://currumbinsanctuary.com.au/conservation-research/kroombit-tinkerfrogs-take-another-leap/

Regarding the Kroombit tinkerfrog recovery program

Currumbin Wildlife Sanctuary: Kroombit tinkerfrog Conservation
https://currumbinsanctuary.com.au/conservation/research/kroombit-tinkerfrog/
https://www.youtube.com/watch?v=c6doqdaDqS0

Queensland Government
https://www.qld.gov.au/environment/plants-animals/conservation/threatened-species/featured-projects/kroombit-tinker-frog

Appendix 3: Key contributors – Kroombit tinkerfrog scent detection dog project

The project team thanks the First Nations Bailai, Gurang, Gooreng Gooreng & Taribelang Bunda Peoples, whose lands include Kroombit Tops, for their ongoing support of the work to conserve Kroombit tinkerfrog.

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Australian Government's Saving Native Species Program

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The Department of the Environment, Tourism, Science and Innovation acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Owners and custodians of the land.

We recognise their connection to land, sea and community, and pay our respects to Elders past and present.

Queensland Government