

Supplementary Material

Thermal drones are highly effective for detecting elusive Bennett's tree kangaroos (*Dendrolagus bennettianus*) in Australia's tropical rainforests

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SUPPLEMENTARY MATERIAL

Table S1. Specifications for the drone and thermal camera models utilised in this study.

Drone	DJI Matrice 350 RTK	DJI Mavic Enterprise 3T
<i>Weight</i>	6.47 kg (with two TB65 batteries)	920 g
<i>Maximum take-off weight (MTOW)</i>	9.2 kg	1050 g
<i>Maximum flight time</i>	55 mins	45 mins
Thermal infrared camera	DJI Zenmuse H30T payload	Built-in camera
<i>Thermal imager</i>	Uncooled VOx Microbolometer	Uncooled VOx Microbolometer
<i>Display Field of View (DFOV)</i>	45.2°	61°
<i>Focal length</i>	24 mm (equivalent focal length: 52 mm)	Format Equivalent: 40 mm
<i>Digital zoom equivalent</i>	32x	28x
<i>Video resolution</i>	1280×1024@30fps	640×512@30fps
<i>Photo resolution</i>	1280×1024	640×512
<i>Pixel pitch</i>	12 µm	12 µm
<i>Spectral band</i>	8-14 µm	8-14 µm
<i>Noise Equivalent Temperature Difference (NETD)</i>	≤ 50 mk@f/1.0	≤ 50 mk@f/1.0

Table S2. Flight details, mean ambient temperature, and the number of individual Bennett’s tree kangaroos detected for each of three drone flights conducted at the Daintree Rainforest Observatory between 21 and 22 November 2024.

Date	Drone and thermal camera	Start time	End time	Flight distance (m)	Mean ambient temperature (°C)	No. tree kangaroos detected
21/11/2024	DJI Matrice 350 + H30T	16:25	16:55	2,445	27.2	2
22/11/2024	DJI Matrice 350 + H30T	5:50	6:20	1,818	24.2	4 (3 + 1)
22/11/2024	DJI Mavic Enterprise 3T	8:50	9:03	685	25.7	1

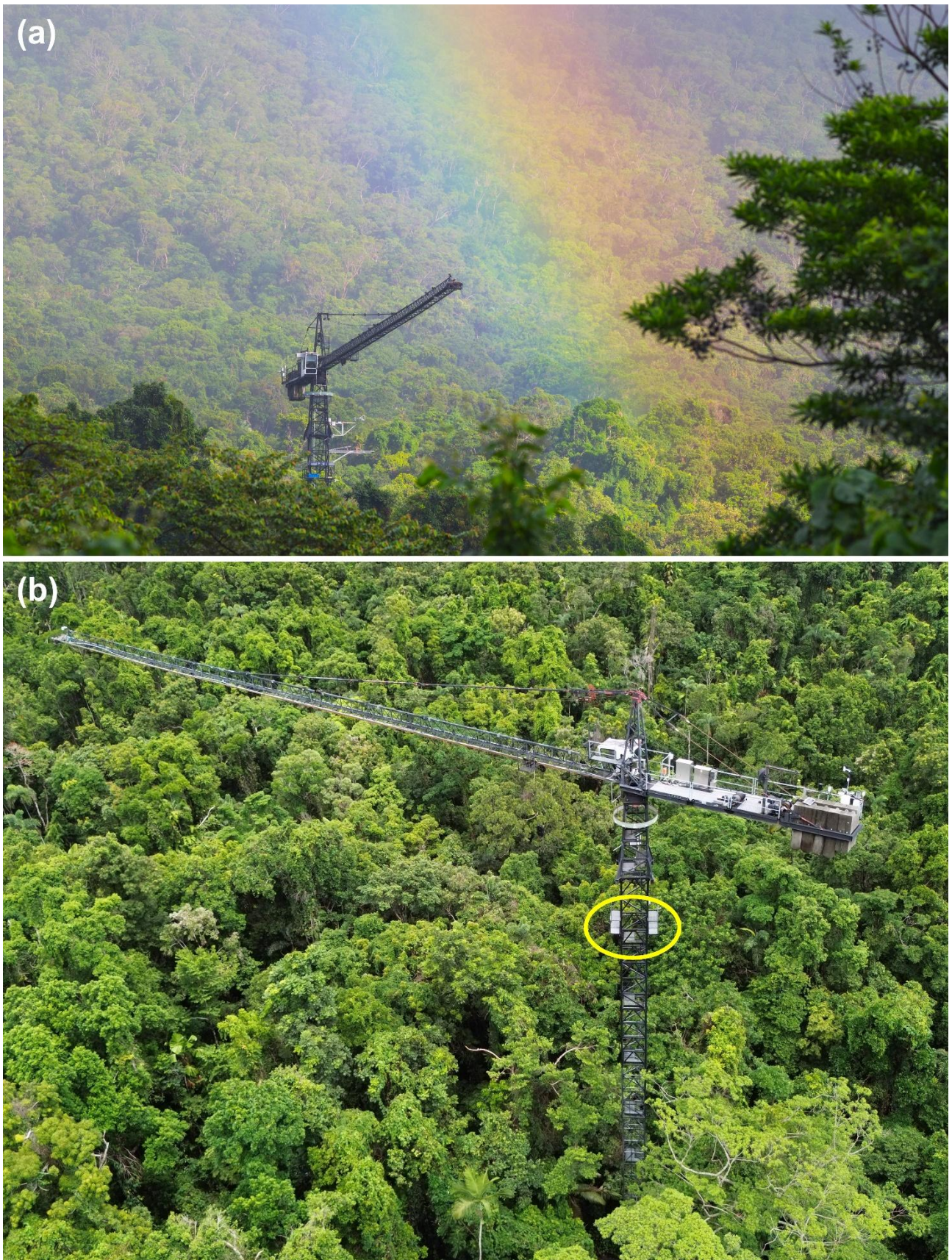


Figure S1. Photos of the 47-metre canopy crane located at the Daintree Rainforest Observatory (DRO) in Cape Tribulation, Australia, showing (a) line of sight with the crane from the clearing where the high-resolution drone was positioned and (b) the platform on the crane tower (circled) where the pilot stood to remotely launch and operate the drone.

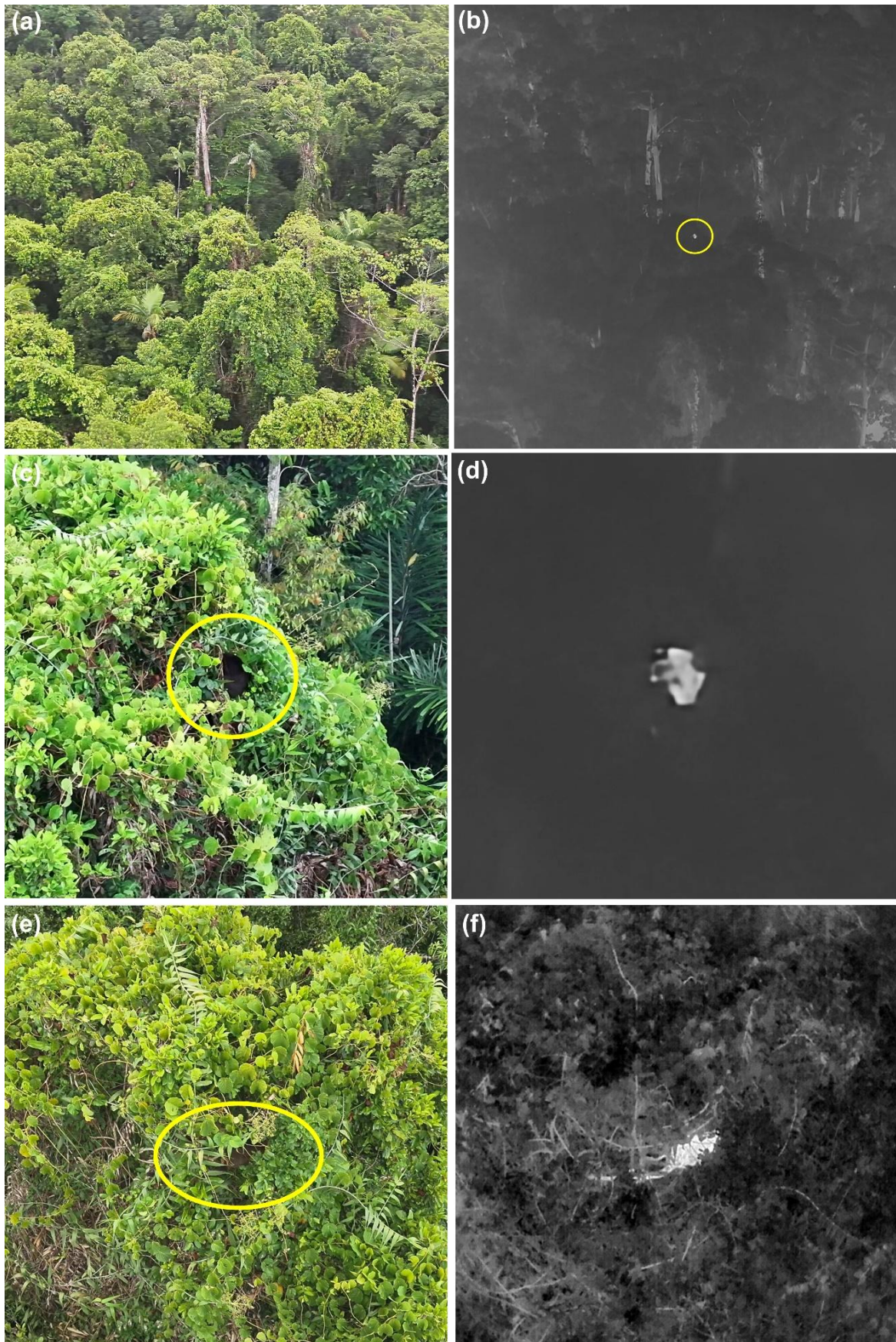


Figure S2. Thermal and RGB images of a single Bennett's tree kangaroo detected with (a–d) high-resolution (1280×1024 pixel) and (e–f) low-resolution (640×512 pixel) drone-mounted thermal cameras. Images (a–d) were captured at 6:15 am on 22 November 2024 in overcast conditions, and (e–f) at 9:00 am on the same date in partly sunny conditions. Wide-angle (a–b) and zoom modes (c–f) were used on both occasions to confirm the species. Images (e–f) are taken with the camera facing -90° directly down (nadir). Paired thermal and RGB images have been cropped to show the same area.