A NEW LOW-COST HAIRTUBE DESIGN FOR THE DETECTION OF THE SPOTTED-TAILED QUOLL DASYURUS MACULATUS IN SOUTH-EASTERN AUSTRALIA

ANDREW J. MURRAY

THE spotted-tailed quoll (Dasyurus maculatus) is the largest carnivorous marsupial extant on mainland Australia, where it has a fragmented distribution in forested habitats in the eastern part of the continent. This species is also found in Tasmania. D. maculatus have been found in a wide variety of forest types from sea level to over 1400 m above sea level, in areas generally receiving in excess of 600 mm of rainfall (Mansergh 1983). The distribution of D. maculatus is believed to have declined by over 50% following European settlement (Mansergh 1983).

As top-order carnivores, D. maculatus occurs at low densities, with large home ranges in forested habitats, which they use differentially. These factors make it inherently difficult to determine the presence and abundance of D. maculatus. A number of techniques have been used to determine the presence or abundance of this species, either specifically, or as part of broad-scale fauna surveys. These include cage-trapping (e.g., Körtner et al. 2003), spotlighting (Watt 1993), hairtubing (e.g., Jones and Rose 1996), sand-padding (Catling and Burt 1997), scat searches (unpubl. data), and questionnaires (e.g., Lunney and Matthews 2001).

The hairtube technique involves the placement in the field of a device baited with a food attractant, which, upon inspection by mammals, retains hair on double-sided sticky tape (Suckling 1978; Scotts and Craig 1988). This hair is then analysed using the techniques described by Brunner and Coman (1974) in order to determine the species that had left the hair. While the hairtubing technique has been used extensively as a general survey technique for ground-dwelling or foraging mammals living in forests (e.g., Lobert et al. 1991; Peacock et al. 1992), it has also been considered to be a useful survey technique for rare mammals (Scotts and Craig 1988). Watt (1993) trialed a number of survey techniques to detect the presence of quolls, and suggested that hairtubing might be an appropriate technique. Jones and Rose (1996) used the hairtube technique to survey for D. maculatus and the eastern quoll (Dasyurus viverrinus) in Tasmania. Using a different design to that detailed in this study, Jones and Rose (1996) recorded a success rate for D. maculatus (based on the percentage of hairtubes which retained quoll hair) of 11.4% in the north-west of Tasmania, but a much lower rate (0 - 3%) elsewhere in the State. These authors suggested that the higher success rate of hairtubing in the northwest was a reflection of the higher population density of the species in that area, compared to the rest of Tasmania. This study reports on the results of a series of trials that investigated the ability of a particular combination of bait and hairtube design to attract quolls and to retain their hair.

METHODS

Study site

The study site, already known to be frequented by D. maculatus (Belcher 1995), was located along the base of a cliff between Stradbroke Chasm and Mount Stradbroke, approximately 4 km west of Suggan Buggan (36° 57' 30" S; 148° 16' 45" E), in East Gippsland, Victoria. The site is 800 m above sea level. The aspect of the cliff-face is east-north-east, and the area receives an annual average rainfall of 600 mm. The vegetation at the base of the cliff-face was dominated by blue gum (Eucalyptus bicostata) with an understorey of bracken (Pteridium esculentum). Below the base of the cliff-face the vegetation was mainly open forest-woodland, with red box (Eucalyptus macrorhyncha), white box (Eucalyptus albens), and cherry ballart (Exocarpus cupressiformis) being the common tree species.


Key words: marsupials, carnivores, survey techniques, hairtube.

AJ Murray, Department of Sustainability and Environment, PO Box 260, Orbost, Vic 3888, Australia. Email: andrew.murray@dse.vic.gov.au. Manuscript received 24 May 2003; accepted 21 April 2004.
Hairtube design

The type of hairtube used in this study consisted of 25 cm x 30 cm pieces of a thin, pliant, clear plastic sheet known as ‘Handiglaze’, which is commercially available from hardware retailers as a 20 m x 1 m roll. Each sheet was bent into a tunnel shape, placed on the ground and held in place with a metal peg, which consisted of a 40 cm length of wire bent into a U-shape and pushed into the ground (Fig. 1). Lengths of garden hosepipe, each approximately 40 mm long, were slit lengthwise and fitted to the vertical ends of the hairtube. Double-sided adhesive tape (Schaeffer and Co. Product Code K5300) was then placed across the hosepipe. The use of the hosepipe creates a much broader surface upon which hair can be retained, and also acts to narrow the tube entrance (pers. obs.). The peg that holds the hairtube in place was also used to secure a double-spoon tea infuser within the confines of the hairtube, which acts as a bait holder. Trials with captive quolls had already demonstrated that the infusers were robust enough to remain intact if chewed (unpubl. data).

Hairtube placement

Trials of this design were undertaken on four occasions (Table 1). Trials were conducted during October 1995, January 1996, March 1996 and May 1996. During each trial 20 hairtubes were placed along the base of the cliff-face that led towards a rock ledge upon which a *D. maculatus* latrine site was located. The last few hairtubes were placed immediately below the rock ledge. Hairtubes were placed 10 – 20 m apart, and the bait holders (tea infusers) were baited with sardines. Although a small number of hairtubes were located in a dense patch of bracken fern, the majority were located in open positions, where soil could be found into which the metal peg could be driven.

The hairtubes were left in the field for up to several months, due to the logistic difficulties in accessing the site. The hairtubes are likely to have been effective for about a week, however, due to the relatively short life of the bait being used, as well as the decline in the adhesive properties of the double-sided tape after about two weeks. At the conclusion of each trial, each hairtube was collected and inspected for hairtube tapes that had retained hair. These tapes were removed on-site and retained for analysis. Hairs removed from the tapes were analysed using the technique developed by Brunner and Coman (1974). The success rate of the hairtubing trials is recorded as a percentage of hairtubes that generated a positive result, rather than any measure of the number of nights over which the hairtubes were placed.

![Fig. 1. The tunnel-shaped ‘Handiglaze’ hairtube design used to survey for *D. maculatus* during four trials in East Gippsland, Victoria.](image-url)
RESULTS

*Dasyurus maculatus* was recorded during each trial undertaken with the tunnel-design hairtube (Table 1). Hairtubing success rates varied from 10% (i.e., two hairtubes from a possible 20), recorded during the January 1996 trial, to 45% (i.e., nine hairtubes from a possible 20), recorded during the March 1996 trial.

Brushtail possums (*Trichosurus* sp.) were also consistently recorded during the trials, with a success rate varying from 5%, recorded during both the March and May surveys conducted in 1996, to 30% recorded during the October 1995 trial. Bush rat (*Rattus fuscipes*) was recorded once during the January trial, and swamp wallaby (*Wallabia bicolor*) was recorded once during the May 1996 trial.

DISCUSSION

The hairtubing trials carried out during this study demonstrate that the tunnel-type hairtube design, in combination with the use of sardines as bait, was capable of attracting *D. maculatus* and retaining their hair at a site the species was known to frequent. The high percentage of hairtubes that were visited by quolls, and which retained hair (10 - 45% of hairtubes), was probably due to the concentration of the hairtubes near a latrine site. These results may represent multiple visits by a small number of animals.

The hairtube design used during this trial has a number of advantages over other designs. It is relatively cheap (around $5.00) to manufacture, especially compared to the hairtube design described in Scotts and Craig (1988), costing in excess of $20.00 per unit. The tunnel design is also easier to carry; most backpacks could comfortably accommodate 30 hairtubes, bait-holders and metal pegs. The addition of the lengths of hosepipe provide a much greater area of double-sided tape against which animals lean against and leave hair. The design is also useful for a range of species other than *D. maculatus*. It has been used, for example, to successfully hairtube long-nosed potoroos (*Potorous tridactylus*) in East Gippsland, Victoria, using the standard bait mix of rolled oats, peanut butter and golden syrup (unpubl. data).

In comparison to the hairtubing technique, conventional cage trapping involves the task of placing traps in the forest, which then have to be checked during each day of trapping. While hairtubing is a technique that is principally aimed at determining the presence of a species, trapping is a technique primarily designed to secure animals in order to undertake more detailed research. Before the widespread use of hairtubes, trapping was the most widely used general survey method.

The major drawback of the hairtubing technique centres on the adhesive properties of the hairtube tape. Should the hairtube tape become wet, either as a result of rainfall or from heavy dew, the adhesiveness of the tape is often substantially reduced. Recent modifications to the hairtube design, which involve placing the tape across the short lengths of hosepipe approximately 2 - 3 cm within the entrance of the hairtube (as distinct from placing the tape across the entrance of the hairtube, as illustrated in Fig. 1), have substantially reduced this shortcoming. The cost of analysis of the hairs captured on the hairtube tape could also make the technique costly. The analysis of the hairs left on the hairtube tape requires considerable experience and access to the appropriate equipment (e.g., microscope). Currently there are very few individuals who professionally analyse hairtube tapes. The current cost of analysis is $5.00 per hairtube, which may be prohibitive for some groups wishing to carry out survey work. While *D. maculatus* is cryptic, the hairtube design described above provides a useful and relatively low-cost method of detecting the species.

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REFERENCES


