

The bush dog *Speothos venaticus*: area requirement and habitat use in cultivated lands

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SUPPLEMENTARY MATERIAL 1 Capture and monitoring

We distributed c. 2,000 information packs among the rural communities of Nova Xavantina, Campinápolis and Água Boa counties (families, businesses and schools) during 18 months (from September 2007), encompassing c. 4,000 km² and 850 households. The packs contained general information about bush dogs, information about our project and a request for immediate contact if a bush dog (or pack of bush dogs) was seen nearby.

We received only 10 responses. On 24 May 2008 we received a telephone call from a farmer reporting that he had captured two juvenile bush dogs that day. We went to the location and evaluated the animals' health (assessment by R. Jorge). Upon verification that they were healthy and in good condition we sedated the dogs with an intramuscular injection of 5 mg per kg tiletamine hydrochloride and zolazepam hydrochloride (Zoletil 50, Virbac, Brazil). We fitted the dogs with 164-MHz VHF radio collars (Advanced Telemetry Systems, Isanti, USA), of an optimum design for the species (DeMatteo & Kochanny, 2004) and placed the dogs inside a cage, near the location where they had been captured, to see if other members of the pack would come looking for them. After 6 hours without any approach from other individuals, and after assessing that the juveniles had fully recovered from sedation, we released them from the cage and tracked them by VHF signal for c. 4.5 hours, until they entered a burrow that had evidence (faeces and smell) of use by a pack of bush dogs the previous night. The pack returned to the burrow at 16.00 and readily accepted the two juveniles. Based on the social interactions between them we assumed that this was the pack from which the two juveniles had been removed (E. Lima, pers. obs.). We waited for the group to enter another burrow (which bush dogs frequently do to rest) and then closed all potential entrances of the burrow. We excavated the burrow carefully, frequently checking where the dogs were, by the VHF signal and visual observation. Once the dogs were in a corner and we were c. 1 m from them we captured them one by one, with a restraining pole. We used the same procedure described earlier to sedate the dogs, and fitted the same type of radio-collars on two adults and three young adults. We also removed the collars from the two juveniles. To determine the ages of the dogs we examined size, fur colour, and teeth (type, quantity and quality). Each collar was equipped with an activity switch. The dogs were kept inside a cage until they had recovered fully from sedation and then they were released. They walked for c. 150 m and entered another armadillo burrow, where they remained for c. 6 hours. When they emerged they acted normally, moving rapidly and in a cohesive manner. They resumed their foraging activity within 1 day and predated a nine-banded armadillo *Dasypus novemcinctus* after 2 days. All subsequent observations within 1 week (and for the remainder of the study) led us to conclude that the procedure had no permanent negative effects on individual dogs or the pack as a whole.

SUPPLEMENTARY MATERIAL 2 Composition analysis

The *Focal Patch* extension of *ArcView v. 3.2* (ESRI, Redlands, USA) creates a table of use and vegetation values for each cell of the home range grid. The use values vary in the range 1–99 (1 being the lowest use). We categorized relative use as follows: low, 1–5; medium, 6–13; and high, 14–99; each encompassing 33% of the cells.

SUPPLEMENTARY MATERIAL 3 Activity patterns by habitat type

We defined three categories of activity: inactive, foraging/moving locally, and moving fast. We determined whether the group was active or inactive by listening to the activity signal sent from the radio. When the activity sensor indicated inactivity, the dogs could usually be located inside a burrow, where they would stay for up to 24 hours. To count the number of individuals in the pack and visually check their general condition, we would wait for them to leave the burrow.

When the sensor indicated activity we estimated the approximate speed of the pack. If the pack moved faster than the approximate speed we labelled the activity pattern as moving fast and if the pack moved slower or remained in one location we labelled the activity pattern as foraging/moving locally. In the latter case we were always able to get close enough to the pack to identify what the dogs were doing. We recorded the geographical coordinates of the location only when the pack could be located visually or by hearing (within c. 10–20 m) or when they were inside a burrow (strong underground signals from VHF transmitters). All records were made for the group as a unit as the group was always cohesive and activity signals and movement were similar for all individuals. Activity records were later correlated with habitat type.

SUPPLEMENTARY MATERIAL 4 Results

When captured the pack comprised 10 individuals: two dominant adults (one male, one female), three young adults (one male, two females) and five juveniles (four males, one female). In the second half of 2008 four animals died (one juvenile male on 27 July, one juvenile male and one juvenile female on 22 September, and one collared adult female on 15 November). Marks on the animals and information from a local farmer indicated that they were killed by local people and domestic dogs. In February 2009 three female pups were born. In September 2009 two young adult males disappeared (one young adult and one juvenile, both with radio-collars). Behavioural observations suggested they had dispersed (E. Lima, pers. obs.). On several occasions prior to their disappearance those males were observed acting as leaders or dominant males when the group was hunting or digging up armadillos. Nevertheless, the possibility of death cannot be ruled out as we were unsuccessful in locating them within and beyond the pack's home range boundaries, with an ultra-light plane, suggesting that the collars stopped working in the same period that the animals disappeared.

In December 2009 we recaptured the entire pack to carry out a general health check and to replace the radio-collar of the dominant female with a collar fitted with a global positioning

system (GPS; Quantum 4000 Small Collar, Telemetry Solutions, Concord, USA). At that point only the two dominant adults (male and female) had VHF collars. One week after the recapture we were unable to relocate the group. We believe that this was because of a weak VHF signal from the dominant female's GPS collar and the failure of the dominant male's VHF collar. We do not believe the pack moved to a different area as a result of stress from the capture. The pack had been recaptured several times previously (for collar replacement) and we always relocated them afterwards without any problems. We were unsuccessful in relocating the pack within and beyond its home range boundaries, using an ultra-light plane. At the end of the study (December 2009) there were seven individuals in the pack (the same two dominant adults (one male, female), two young adults, older than 1 year (one male, one female), and three juvenile females, 10 months old, from the last pregnancy).

Of the 245 locations where the pack was recorded only 10 were recorded twice, and therefore during 18 months of data collection 235 distinct locations of the pack were recorded. Seventy unique locations and nine (of the 10) duplicates were den sites. There was no record of a burrow being used more than twice. Five of the den sites that were used twice were used when pups were 0–2 months old. Three of the nine den site duplicates were definitive returns after the pack had been recorded at other locations, two were of the same den site on consecutive days (so the pack may have remained inside for >24 hours or left and come back before we located them again); two were when the pack killed an armadillo and rested in the same den until the following day, and two were of the same den site on non-consecutive days, but without other locations recorded in between. Lima et al. (2012) observed the same highly mobile movement pattern and ephemeral use of burrows by another pack. Our findings indicate that bush dogs in eastern Mato Grosso are always on the move, even with young pups.

We recorded 62 predation events during our study: 59 involving nine-banded armadillos (61 individuals), one involving an agouti *Dasyprocta azarae*, one involving a paca *Agouti paca* and one involving a naked-tailed armadillo *Cabassous unicinctus*. Fifty-eight nine-banded armadillos and one paca were killed inside their burrows.