



Beefy and the beast

Special edition, March 2010

This special edition of *Beefy and the beast* summarises the findings of the wild dog movement and dispersal study, which has been the major wild dog research project conducted by Biosecurity Queensland (part of the Department of Employment, Economic Development and Innovation) over the last few years. We have also outlined our new project that examines using guardian dogs to protect livestock.

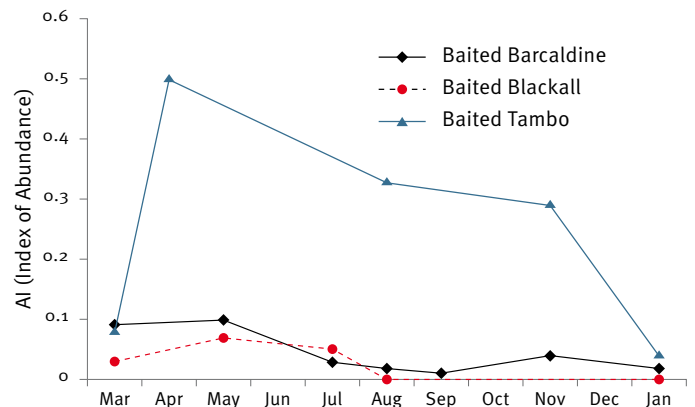
This is the last issue that will be printed. From now on, the newsletter will be available online. If you would like receive notification of the next issue, please send your name and email address to lee.allen@deedi.qld.gov.au

Results of the wild dog movement and dispersal study

In Issue 16 (June 2007), we reported the results of our evaluation of broadscale, coordinated baiting programs in central western Queensland. In brief, we found no difference in wild dog activity between properties that regularly bait and those that don't. We also discovered that while baiting programs conducted from May to September produced, on average, a 46.5% decrease in dog activity (± 10.2), programs conducted in March, April, October or November showed significant increases in dog activity after baiting—an 82.5% increase (± 54.5) in March and April, and a 219.1% increase (± 100.9) in October and November. It was this summertime increase in wild dog activity that completely negated any positive baiting effects made during the year.

One characteristic of wild dogs is their visible presence in autumn during mating season. It's curious that activity is highest during autumn, yet lowest in spring and early summer when wild dog numbers should be at their highest in their annual cycle (see Figure 1, from Issue 16, below). We were intrigued to know what causes this because assessments of wild dog numbers, effectiveness of baiting and even when to bait relies, indirectly or directly, on measurements or our perceptions of wild dog 'activity'. By putting satellite collars on wild dogs we discovered how far wild dogs disperse from their natal territories. This will influence how wide buffers need to be to protect livestock. We also wanted to know which dogs moved and why their seasonal activity was so different to what the actual numbers should be.

Average wild dog activity by month on all baited properties for pre- and post-bait surveys 2003–06



Average wild dog activity on non-baited properties by month 2003–06

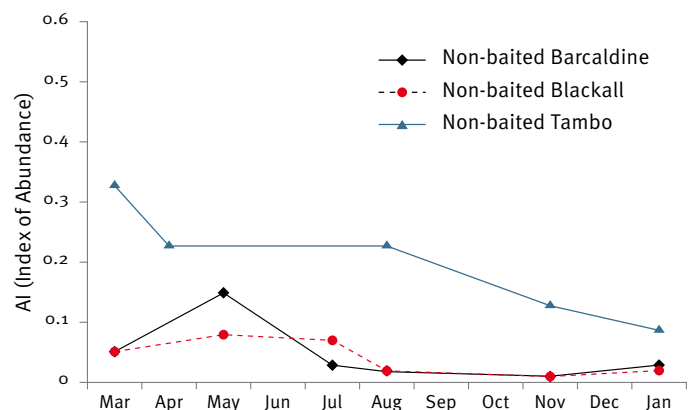
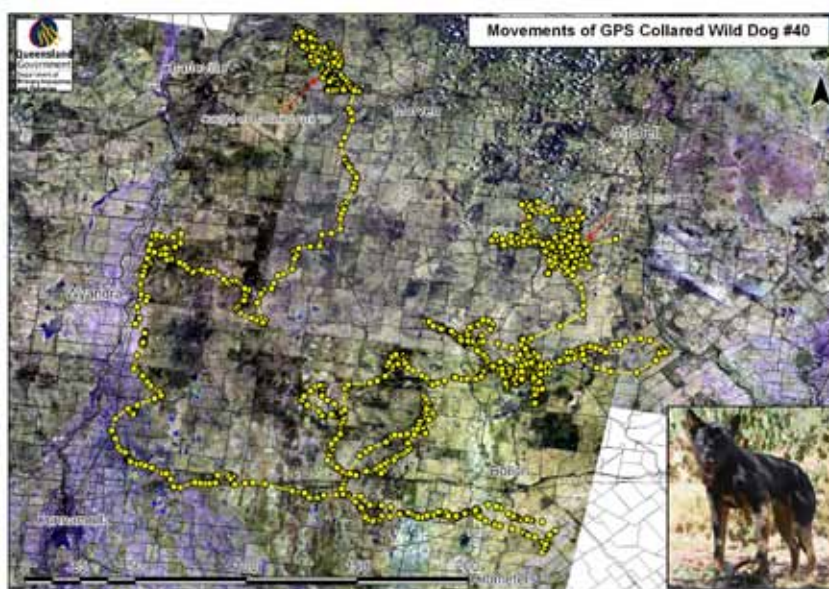
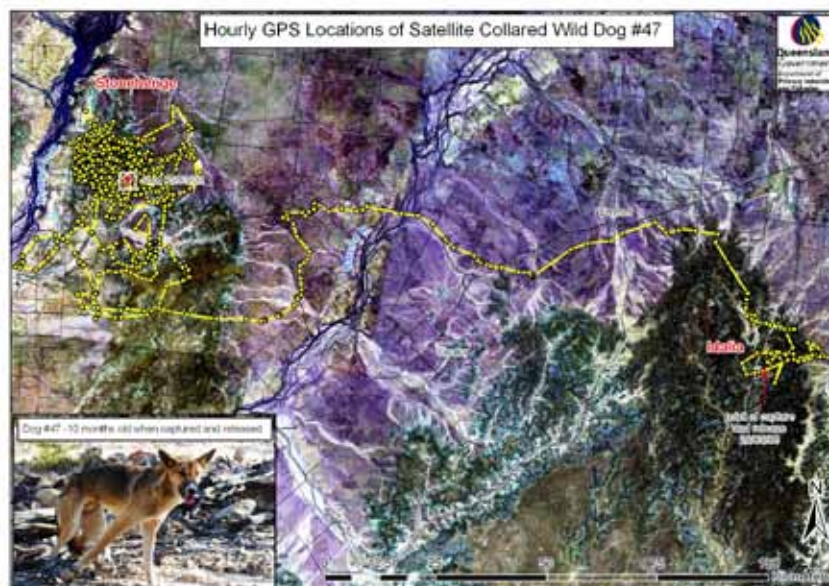


Figure 1: Mean activity for baited versus non-baited properties (from Issue 16)

In issues 16 (June 2007) and 17 (May 2008), we reported on the first two years of this study. Two collared dogs dispersed 300 km or more but had been prevented going any further by barrier fences (netting fences). A third dog at Blackall had made four movements beyond his normal territory, up to 100 km away. Since then we redeployed 10 satellite collars at Halton (40 km east of Charleville) in April 2008 and five new Queensland Parks and Wildlife Service-funded collars on wild dogs in Idalia National Park (west of Blackall) in May 2008. We have recovered all but two of these as of November 2009 (two collars malfunctioned; one at each site).

How far do wild dogs disperse from their natal area?

Dispersal distances in 2008–09 have broken all previous records. We captured one of the Idalia dogs on a sheep property south of Stonehenge, 200 km west of his capture location. He had wool tangled in the frayed end of the satellite aerial and was a few hundred metres from a dead sheep that had been fed on. This wild dog had crossed the flat, largely treeless, Mitchell grass downs around Emmet and made the trip in seven days. The record for the largest distance travelled by a wild dog was 1300 km from Halton to Wyandra to Cunnamulla to south-east of Bollon and back towards Mitchell over four months. We tracked him down on a sheep and goat property near Dunkeld, about 150 km from where we had initially collared him. The furthest distance travelled from point of origin was another Halton wild dog. This dog ended up 560 km away on Collymongel Farms, 20 km from Collarenebri in New South Wales. He had travelled there in 31 days.



Maps 1, 2 and 3: Hourly locations illustrating the long-distance dispersal movements of three male wild dogs initially collared at Idalia National Park (Map 1) and Holton Station, east of Charleville. Holton Station has been regularly baited with 1080 for several years.

All six wild dogs that have travelled long distances have been males of above-average weight when collared. They have all dispersed between the months of June and September when most wild dogs are preoccupied with rearing pups. This is probably the safest time for a wild dog to travel long distances as it involves less encounters along the way. Many other females and males dispersed or expanded their territory, but no further than 30 km. It seems that movements beyond normal territory of 10–30 km are common for both sexes and frequently occur prior to dispersal or expansion of their territories. Baiting facilitates dispersal or expansion of territories and is the most likely explanation for the rapid increase in dog activity after baiting over summer. This timing corresponds to when juvenile wild dogs become independent of adult minders and there is a lot of pressure on packs and pack members for vacant space.

Why does activity decrease between autumn and spring?

While measures of activity (counted as sets of tracks crossing tracking stations) can show a 75% decrease between autumn and spring, the average distance individual wild dogs travel per day (9–21 km) remains the same throughout the year. However, the way they use their territory changes. Images 1 and 2 illustrate that males are mostly responsible for increased activity along roads and travel ways during autumn. Females move just as much as males but their movements are less visible. They may cross roads and recognise roads as territory boundaries but they don't travel on roads as males do. During autumn many of the female's movements are outside their territories.

After whelping and while rearing pups, males and females reduce the area of their movements within their territory. They frequent the most inaccessible areas; infrequently use travel ways like roads, fence lines and creek beds; and they generally keep out of sight. They seem to be intentionally avoiding areas of human activity. Most of their activity is centred on the den and the pups.



Mating season (autumn)



Whelping season (winter)



Pup rearing (spring)

Image 1: The hourly movements of a three-year-old, breeding female wild dog (#20) during different seasons of the year. Note how a road (territory boundary) is visited during winter and spring (middle and lower image) but she does not walk along it. In mating season (upper image) she makes numerous movements outside her territory.



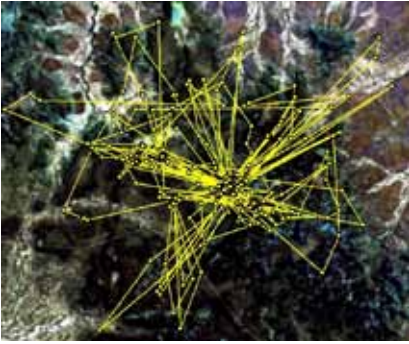
Mating season (autumn)



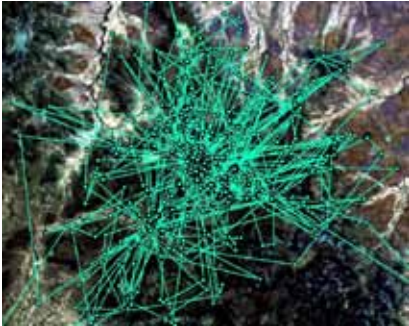
Whelping season (winter)

Image 2: The hourly movements of a yearling male (#26) in an adjoining territory during mating (upper) and whelping (lower) season. During mating season, males focus their activity along the travel ways inside their territory (roads in this example), but six weeks later after whelping they seldom travel the same roads.

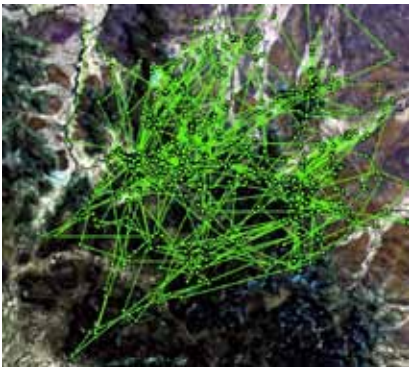
From what we have observed tracking down collars during whelping and pup-rearing seasons, even when days old, pups may be moved short distances between den logs. When pups outgrow their den they get 'planted' in thick regrowth or vegetation that provides protection from predators, including eagles. Adults remain nearby until about November when the juveniles are about five months old. Once the pups are mobile they are extremely hard to stalk as adult minders vocalise warnings and quickly gather them and flee. Within breeding packs there is an enormous amount of time spent in the vicinity of the den. Movement patterns of both males and females during whelping and pup rearing are characterised by a focal point (or points if the pups are moved), with brief radiating movements presumably to catch and return prey.



Whelping season (July to August)

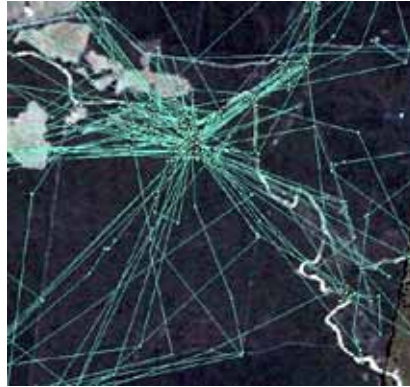


Pup rearing (September to November)



Pups independent (November to January)

Image 3: The hourly movements of an adult female (#45) on the edge of Idalia National Park during whelping (upper image), while rearing pups (middle image) and after the pups became independent (lower image). Note that between whelping and independence of the pups, the activity of pack members is focused around the den, which will be located in the most inaccessible parts of their territory (thick mulga ridges in this case). After November she resumes typical non-breeding movement patterns, moving throughout her territory and foraging out across open downs country.



Whelping season (July to August)



Pup rearing (August to September)

Image 4: The hourly movement patterns of a yearling male (#22) at Western Creek state forest during whelping (left image), also focused around the den, and during pup rearing (right image) as pups are moved around the territory.

Over summer and leading up to mating season, wild dogs are at their highest densities. Independent juveniles and the previous year's offspring are crammed in or around the territories of adults. Typically, the territory size of an independent juvenile will be $< 2 \text{ km}^2$. They make frequent short movements beyond their territory, searching for vacant area during this time. Eventually they will be incorporated into a pack, expand into a newly vacated territory, get squeezed between territory boundaries or pushed into less favourable areas. Unless they find a suitable territory they are likely to starve to death, be killed by other wild dogs or forced to disperse. The most likely explanation of why baiting between October and April resulted in a post-baiting increase in dog activity is that the area is being rapidly re-colonised by juveniles and yearlings who are under intense pressure to find vacant territory.



Image 5: The yellow dots represent the hourly locations of a male, six to nine months old (#19), at Kumberilla state forest between January, when he was collared, until late April, when he dispersed through a hole in the former Wambo dog netting check fence (red line). Not associated with a breeding pack, he illustrates how the territories of non-pack 'loners' are sometimes squeezed between the territory boundaries of adjoining packs.



Image 6: For three weeks prior to dispersing $> 1000 \text{ km}$, the adult male dog (#40) east of Charleville lived in a narrow 500 m strip that was 15 km long, between the power line and the Warrego Highway. He had been unsettled for three months and had temporarily resided at several locations on Halton and neighbouring properties.

How does this data influence control practices?

With 15% of collared dogs that we have tracked for more than a few months going on to disperse 100–560 km from their origin, the concept of controlling wild dogs in a buffer surrounding vulnerable livestock is not going to prevent incursions. How authorities protect pure dingoes in conservation areas from wild dogs, or prevent dingoes from moving out of these conservation areas and causing livestock attacks, is a challenging proposition. The seasonal movement data suggests that part of the 46% average reduction in dog activity we observed after baiting programs conducted between May and September could be just a seasonal change in their visibility and not a consequence of reduced numbers. Baiting destroys some wild dogs but it also facilitates dispersal. We must now view changes in activity following baiting, or even no apparent change, with caution. We know there is a reproductive surplus of juveniles and yearlings that are under pressure to locate a territory or be faced with starvation or being killed by those defending their territory. From November onwards, juveniles (now only five months old) are likely to be very vulnerable to poison bait. We speculate that baiting over summer and autumn may be more effective than during winter and spring when adults are focused on their pups. The results also suggest that repeated follow-up programs a few weeks apart are required to mop up the re-colonisers who will rapidly move to the baited area during this time.

How does this data affect using activity as a measure of wild dog abundance?

Activity—counting the sets of footprints of wild dogs on tracking stations—is often used as a way to measure their relative abundance, make comparison between predator species and/or measure effectiveness of control programs. Arguably, scat counts, trapping rates and spotlight counts (if they were possible) would also show a similar pattern as they are substitute measures of activity. While wild dog activity can be independent of their true abundance, the seasonal pattern is regular. Activity peaks in mid autumn and is at its lowest point in mid spring.

The data highlights two important principles when using activity as a measure of wild dog abundance:

- If you use activity to monitor abundance of wild dogs, repeat and/or compare activity measurements for the same months/seasons across years. You cannot legitimately compare activity measurements (of wild dogs) calculated in different seasons.
- If you use an index of activity to measure the effectiveness of control programs, conduct the pre- and post-control surveys of activity as close as possible (i.e. within days or weeks) and simultaneously monitor a non-baited area for any underlying trends.

Why is calf predation more frequent and losses greater in baited areas?

These movement studies have given us further insight into this unusual phenomenon and allowed us to reconsider our earlier studies on calf predation. Earlier, researchers had predicted that baiting would fracture packs and disrupt the normal constraints to breeding, allowing subordinate females to breed and raise litters. However, our cattle predation studies showed that baited areas were being re-colonised within weeks by wild dogs with adult-sized feet and there was no evidence that increased breeding was responsible. The dispersal data obtained from this study supports this finding. We speculate that the wild dogs that survive or re-colonise baited areas function quite differently to stable packs in non-baited areas. Their pack size is smaller, their average age is less and, being younger, they have less hunting experience. When seasonal conditions are poor, wild dogs in baited areas do not have the pack size, age or hunting experience to handle large prey like kangaroos and, consequently, they switch to attacking young calves. However, members of stable packs faced with the same dilemma hunt in larger groups and efficiently handle larger kangaroo prey.

The seasonal movement of members of breeding packs (males as well as females), from whelping until when the juveniles become independent, is quite distinctive. Not only do they reduce the area they cross in these months, but most of their time is spent in close vicinity (< 1 km) of the pups in the roughest, most inaccessible location within their territories. We have discovered that the adult minders are very cautious and will extract pups from an area at the least indication of a threat. We predict that while the pups are young, adult minders ensure their



naïve pups have no contact with cattle. Similarly, we suspect that cattle with vulnerable calves would know where dens were located either by smell or from the frequent activity and presence of adult wild dogs. They too would likely avoid the den area and frequent the open, better-pastured areas. In contrast, the wild dogs that re-colonise shortly after baiting programs are unlikely to be rearing pups and would be active over their entire territory. We found in these earlier studies that the wild dogs in baited areas were quite poor at producing pups. We suspect the disruptions produced in packs as a consequence of baiting reduces successful pairing during mating and also reduces the number of pack members that can rear the pups that are produced.

New project: Examining livestock guardian dogs

The movements of wild dogs around the boundaries of adjacent wild dog territories gives us cause to understand why livestock guardian dogs might be successful. Wild dogs recognise the territory boundaries of adjacent packs. They seem to avoid the core areas and cautiously move around the perimeter of the neighbouring territories. It's quite likely livestock guardian dogs also mark and defend a territory, which is recognised by wild dogs.

In May 2009, we placed GPS data loggers on eight maremma guardian dogs at Dunluce Station, a 46 500 ha sheep and cattle property 36 km west of Hughenden. Dunluce is the most northern sheep property remaining in Queensland. According to owners Ninian and Ann Stewart-Moore, it remains in sheep only because 24 maremmas do a remarkable job of protecting them from wild dogs. In 2002, Ninian and Ann were considering getting out of sheep. They were losing 15% of their 20 000 herd each year, mostly to predation, and could no longer control the losses with regular wild dog baiting. Since using guardian dogs their losses are now an acceptable 3% and are mostly from causes other than predation.

The data loggers will record GPS locations every 30 minutes to test the hypothesis that guardian dogs act like placebo wild dogs, marking a territory that is avoided by wild dogs. We are interested how far beyond their paddocks guardian dogs patrol and whether there are any gender

or individual differences in their daily movement patterns. We are going to monitor the abundance of other native and introduced species in paddocks with and without maremmas as well. Anecdotal accounts suggest large kangaroo species are less abundant in paddocks containing guardian dogs. Eventually we will test how guardian dogs respond to the apparent presence of wild dogs by playing recorded howling and establishing wild dog 'scent stations' in their paddocks using wild dog urine and faeces. In 2010, we will collar the wild dogs that live on the properties adjoining Dunluce to see how the movements of guardian dogs and wild dogs overlap. We intend to repeat this study on a beef cattle property elsewhere in north-west Queensland where wild dogs are common in successive years. Recently, some have proposed re-establishing dingoes in livestock production areas to control foxes and cats and overabundant herbivores (kangaroos), and enhance biodiversity. If guardian dogs are shown to exclude wild dogs as predicted, perhaps some of the biodiversity benefits of having dingoes can be produced by guardian dogs without compromising livestock production.



A couple of maremma guardian dogs at Dunluce, west of Hughenden