

# PERI-URBAN WILD DOGS: DIET AND MOVEMENTS IN NORTH-EASTERN AUSTRALIA

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## ABSTRACT

Knowledge of peri-urban dingo or wild dog ecology can assist management agencies in developing management approaches that alleviate human-wildlife conflicts. Here we summarise (1) the food and dietary items identified in wild dog scats and (2) wild dog movement ecology in urban areas. Individual prey species commonly observed in scats included agile wallabies, northern brown bandicoots and swamp wallabies. Dietary overlap analyses indicated that wild dogs ate the same types or sizes of prey in different regions. In general, wild dogs occupied small fragments of bushland within an urban matrix, were active at all times of the day, and lived within a few hundred meters of houses and humans at all times. These data suggest that urban wild dog management strategies should focus on the mitigation of impacts at the individual or group level, and not population-level reductions in numbers.

**Keywords:** dingo, human-wildlife conflict, predator control, prey preference.

## INTRODUCTION

Dingoes and other wild dogs (*Canis lupus dingo* and hybrids) are distributed across 85% of Australia. In areas with substantial human conflict with wild dogs, such as rural areas, a large body of knowledge of wild dog ecology and management assists the mitigation of wild dog impacts. Conflict with wild dogs also occurs in and around many urban areas of Australia (DEEDI 2011), but there is very little available information on urban wild dog ecology, and management practices developed and used in rural areas (e.g. broad-scale poisoning, shooting) are usually unsuitable in urban contexts. There is pressing need to better understand basic wild dog ecology and develop suitable tools and approaches for wild dog management in urban contexts.

Besides simple acknowledgement of wild dog presence, early work on urban wild dogs described their parasites and pathogens, genetic identity, case studies of their impacts, and preliminary findings on their movement ecology (Allen et al. 2013). This led to the creation of the most substantial urban wild dog research program undertaken to date, which was administered by the Invasive Animal Corporative Research Centre and delivered by Biosecurity Queensland. Project activities included research on wild dog hybridisation and relatedness, perceived and actual impacts, diet, reproductive biology, disease ecology, space use, and responses to a variety of novel control tools and management strategies.

In this study, we briefly summarise the research findings relating to urban wild dogs' diet and movements. Our aim here is to describe the primary prey species of urban wild dogs and their general patterns of activity, supplemented with additional information on breeding sites from selected individuals.

## METHODS

We collected and analysed wild dog scats from around several cities along the Queensland coast between September 2012 and June 2015 (most in 2013 and 2014). Wild dog capture and collaring was undertaken between May 2013 and March 2016 at Gold Coast, Moreton Bay, Sunshine Coast and Townsville. After their release, we walked in on some wild dogs collared during the breeding season (May to September) to determine the nature of 'hot spots' and locate breeding den sites. Full description of the methods are freely available in Allen et al. (In press) and McNeill et al. (2016).

## RESULTS

We collected a total of 546 scats from urban areas (Allen et al. In press), which identified bandicoots (*Isodon macrourus*) and small macropods (*Wallabia bicolor* in south-east Queensland, and *Macropus agilis* in north-east Queensland) as primary prey for urban wild dogs (Figure 1).

We captured, collared and released 37 wild dogs, which were each monitored for 11–394 days. Individual activity patterns varied, but in general, wild dogs in our study could be considered nocturnal (McNeill et al. 2016), with a mean daily travel distance of 6.86 km/day. Overall mean home range size was 17.47 km<sup>2</sup>, and at all times dingoes were within 1,000 m of houses and buildings. We detected den sites on several occasions, all of which were characterised by large hollow logs in fragments of relatively open woodland habitat rarely disturbed or visited by humans. One group of dens was located approximately 500 m from two farm houses home to several large and unrestrained domestic dogs (Figure 2).

## DISCUSSION

Wild dogs consumed a wide variety of food items, but bandicoots and small macropods were the two most frequently occurring prey in both north-eastern and south-eastern Queensland (Fig. 1). Wild dogs require approximately 75 g/kg body weight of food per day, or roughly a 'rabbit sized' meal per day for an average sized adult dog. Rabbits (*Oryctolagus cuniculus*) were detected infrequently, probably reflecting their relative rarity in urban areas along the Queensland coast, but 'rabbit sized' bandicoots featured heavily. A variety of threatened species also featured in scats (Figure 1), including koalas (*Phascolarctos cinereus*). Wild dogs have been identified as a key threat to koalas, particularly in fragmented bushland areas characterised by urban ecosystems (Mifsud 2011). A concurrent and intensive koala monitoring program in Brisbane, where we collected wild dog scats and released collared wild dogs, reported that 154 of 503 (31%) tagged koalas had been killed by wild dogs over a 3.5 year period (EVE 2016). Most of these occurred in the first half of the study (EVE 2015), indicative of extended periods where wild dog predation rates of koalas can approach 50% (Allen et al. In press).

Wild dog activity patterns were highly variable between individuals (McNeill et al. 2016), but nevertheless suggested a general nocturnal pattern of behaviour. Rural wild dogs are also typically nocturnal or crepuscular. Our findings are consistent with the view that periods of more intensive human activity represent 'high risk' times to wild dogs. That human activity represents a threat or risk to wild dogs may be one reason why wild dog movements appear constrained to bushland fragments (Allen et al. 2013; McNeill et al. 2016), where dog dens are located in 'hidden' places seldom visited by humans (Figure 2). That dingoes can still successfully breed and raise litters in such contexts is a tribute to their ecological flexibility and adaptability, likely developed as a result of their long association with humans. These traits also contribute to the difficulty manager's experience when trying to control wild dogs and their impacts, both in urban and rural areas.

Given wild dogs' preference for natural wildlife prey (Figure 1), reducing or eliminating access to human-sourced food sources is unlikely to influence wild dogs to any substantial degree. Attempts at reducing population-level abundance of wild dogs have been the principal approach used to address wild dog impacts. Yet density-damage relationships have not yet been determined for wild dogs, and population-level control is almost never achievable in urban contexts given wild dogs' flexible habitat requirements and the logistical and operational constraints to the use of common lethal control tools (e.g. poison baiting). These realities imply the need for a revision of recommended best-practice approaches to mitigating wild dog impacts in urban areas, and suggest that individual-level or group-level approaches may be more appropriate. Further knowledge of the characteristics of wild dog 'hot spots' and impacts on fragmented populations of native fauna should assist in clarifying appropriate management approaches and justifications for future wild dog control efforts.

## REFERENCES

Full details for all references used in this report can be found in the following:

Allen B. L., Carmelito E., Amos M., Goullet M. S., Allen L. R., Speed J., Gentle M. and Leung L. K. P. (2016) Diet of dingoes and other wild dogs in peri-urban areas of north-eastern Australia. *Scientific Reports* 6, 23028.

McNeill A. T., Leung L. K.-P., Goullet M. S., Gentle M. N. and Allen B. L. (*In press*) Dingoes at the doorstep: home range sizes and activity patterns of dingoes and other wild dogs around urban areas of north-eastern Australia. *Animals*.

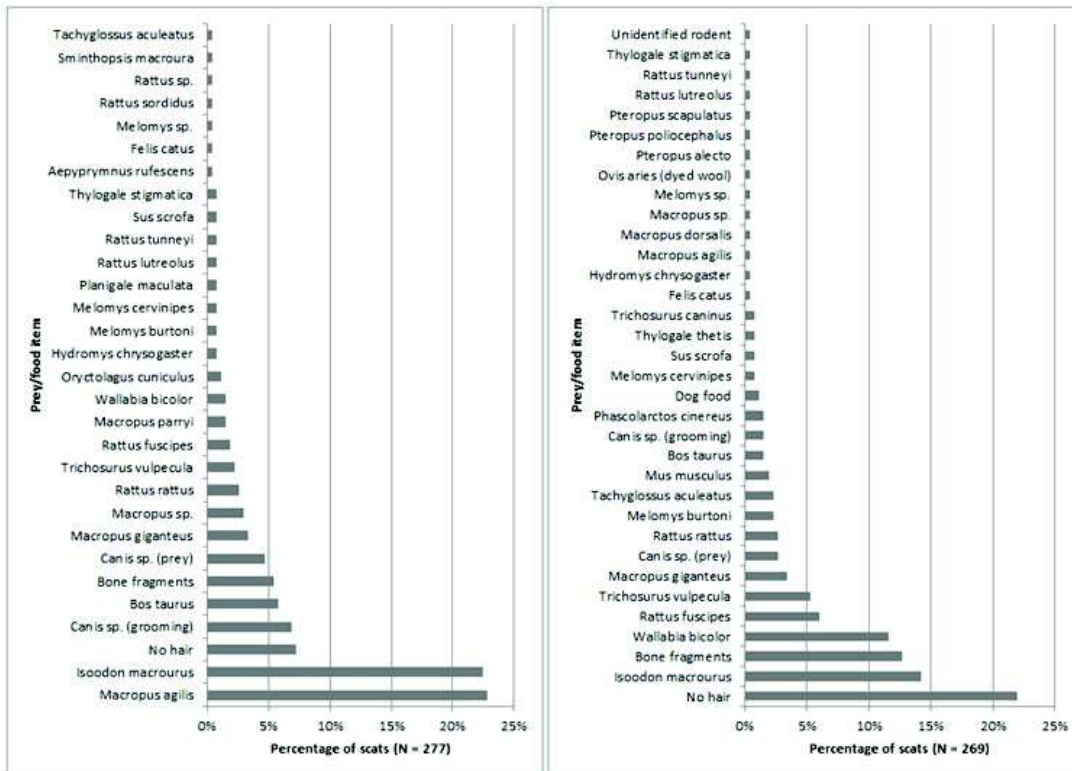


Figure 1 – Frequency of food and prey items detected in wild dog scats from urban areas of north-east (left) and south-east (right) Queensland (adapted from Allen et al. 2016).

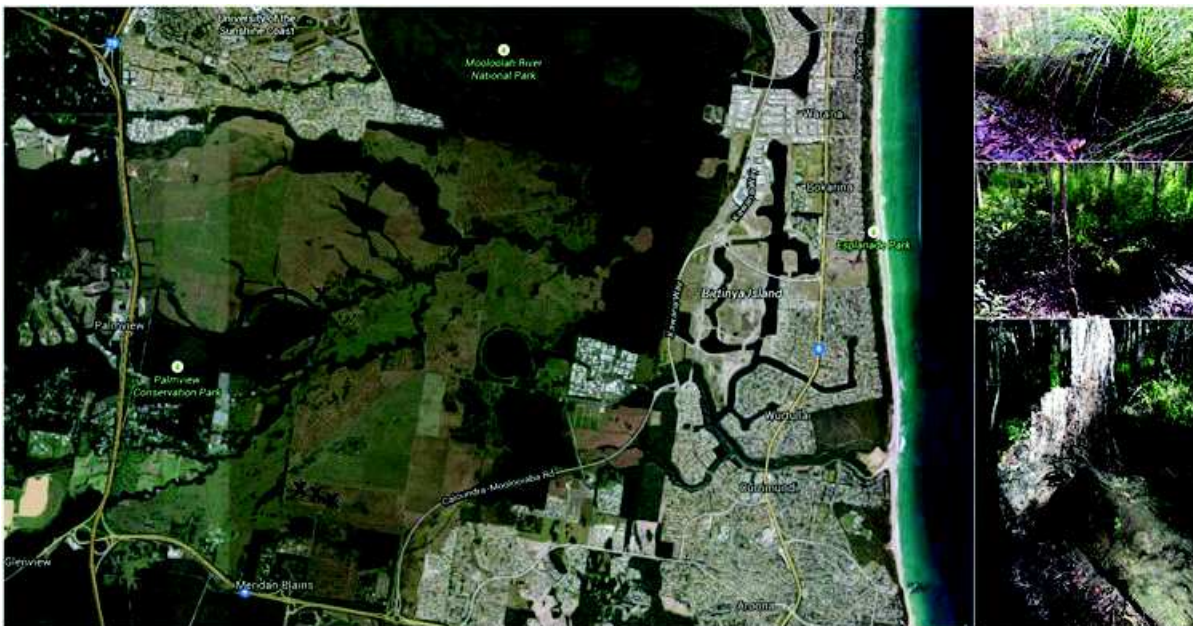


Figure 2 – Wild dog den sites (X) frequently visited by two female dingoes in 2014 and 2015. The three dens in the south were used by SCDog10 in 2014, when pups were born in October. The four dens in the north were used by SCDog09 in 2015, when pups were born in June. The three circled dens in the north are shown at right.