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Manual

Fauna Sensitive Transport Infrastructure Delivery Chapter 21: Species profile – Dingoes

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1 Introduction

Dingoes were introduced to Australia by Asian travellers an estimated 5000 to 12,000 years ago[1]. There is debate over the classification and management of dingoes due to their recent introduction relative to other Australian native species, conflict with livestock farmers, and interbreeding with domestic dogs. Dingoes have been federally listed as native species under the *Nature Conservation Act* 1992 and are protected on federal land in Queensland, such as national parks. Under state legislation in Queensland, dingoes are classed as a type of 'wild dog'. The term 'wild dog' encompasses all free-living canines in Australia, including dingoes, wild domestic dogs – also referred to as feral dogs – and dingo-domestic hybrids. Wild dogs are classified as restricted invasive animals in Queensland under the *Biosecurity Act* 2014. Queensland landholders are legally obliged to take reasonable steps to control wild dogs on any land that is not federally managed. Local government agencies are responsible for wild dog control on state owned land and Department Transport and Main Roads projects may occasionally need to cooperate with these agencies regarding wild dog management. This is most likely if projects intersect current management actions such as wild dog fencing.

Recent genetic studies have found that domestic dogs and dingo-domestic hybrids are less prevalent in the wild dog populations than previously thought. A 2023 study found that of 171 Queensland and New South Wales wild dogs analysed with new genetic technology, 37% were pure dingo, 99% were over 70% dingo, and none were pure domestic dog[2]. Improved understanding of the genetic relationship between dingoes and domestic dogs and management actions are rapidly evolving with the advancement of genetic technology.

This chapter will use the term 'dingo' for pure and hybrid dingoes and 'domestic dog' for pure domestic dogs. When the term 'wild dog' is used, it will encompass both dingoes and domestic dogs, as this is the terminology used in state legislation. The chapter will highlight the important ecological role of dingoes and their potential interactions with transport infrastructure.

2 Ecology

Top-order predators perform key functional roles in ecosystems, and their decline has been identified as a major factor of declining biodiversity across the world[3]. Dingoes are top-order predators. Due to their position at the top of the food chain, changes to dingo abundance and behaviour can have impacts on each level of the food chain below them.

Dingoes can suppress populations of red foxes (*Vulpes vulpes*) and feral cats (*Felis catus*) through direct predation, defence of territory, and/or competition. This suppression of foxes and cats can reduce predation pressure on critical-weight-range (CWR) mammals (mammals between 35–5500 grams that are highly impacted by invasive predators and are consequently the fauna group most vulnerable to extinction in Australia[4]) (Refer to Chapter 15)[5]. While dingoes also prey on CWR mammals, due to their larger size and pack hunting behaviour, their diet also includes larger species

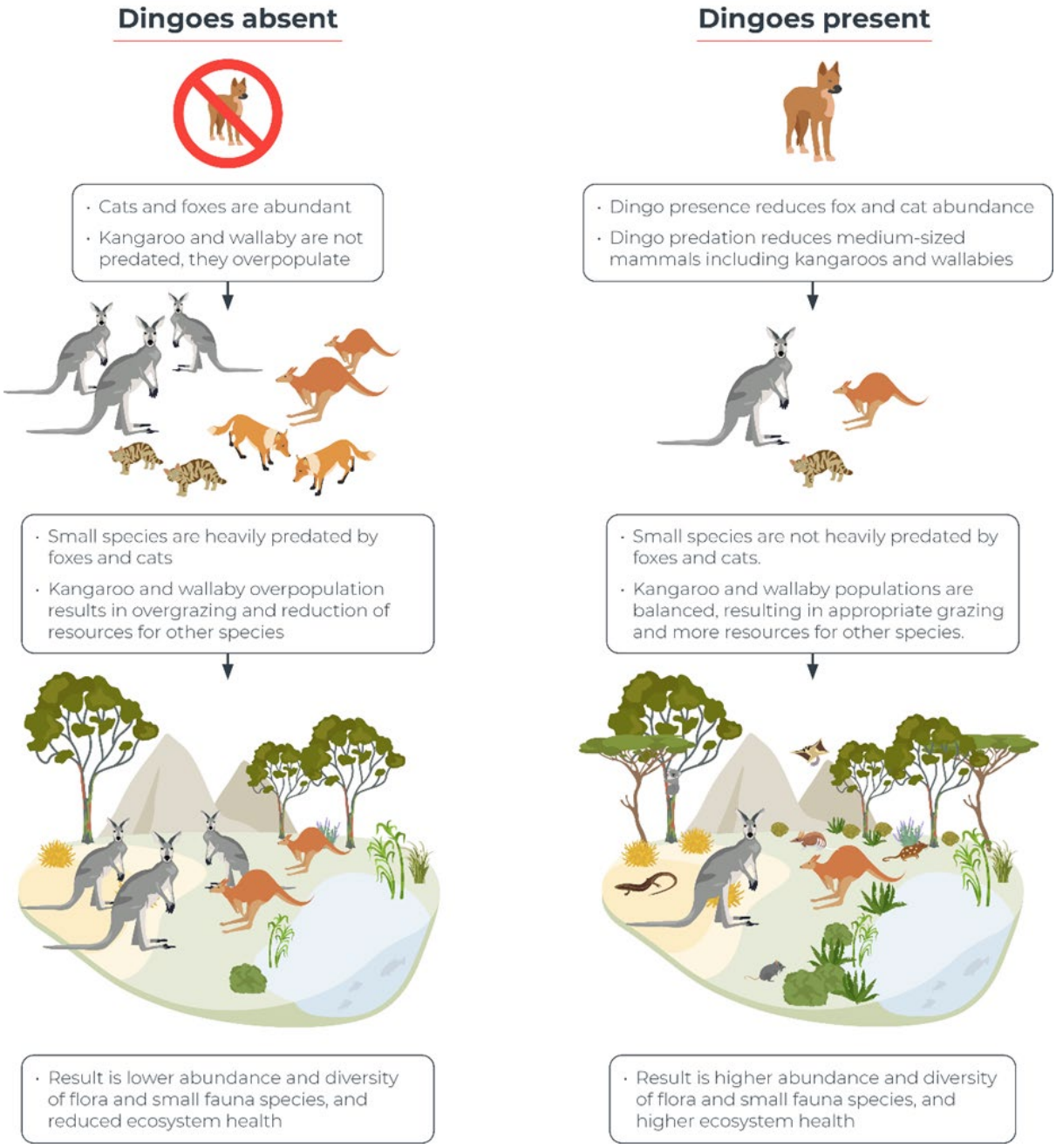
[1] (Fillios and Taçon 2016)
[2] (Cairns et al. 2023)
[3] (Letnic et al. 2012)
[4] (Chisolm and Taylor 2010)
[5] (Ritchie and Johnson 2009)

such as kangaroos and wallabies. This difference in diet means that dingoes impose relatively less predation pressure on CWR mammals and more pressure on medium-sized mammals in comparison to cats and foxes[6]. This relationship is likely to also exist for other fauna groups such as reptiles, amphibians, bats, and birds. The suppression of kangaroo populations by dingoes is also often beneficial to ecosystems because it helps to reduce incidences of kangaroo overpopulation that can degrade vegetation and reduce the availability of food and shelter for other species including amphibians, invertebrates, reptiles, and small mammals[7]. This reduction is also expected to reduce the number of WVC involving kangaroos. With this relatively lower predation pressure and the suppression of foxes, cats, and kangaroos, dingoes are predicted to have a net positive impact on small species and ecosystem health, as demonstrated in Figure 2[8].

For these reasons, the dingo has been flagged as a potential biodiversity value. There is still contention about the impacts of dingoes in different ecosystems, and more research and careful consideration in every context is required. Most ecological literature agrees that the reduction and/or disturbance of dingo populations in ecosystems in which they are present should be avoided.

[6] (Letnic et al. 2012)
[7] (Ritchie et al. 2014)
[8] (Johnson et al. 2007, Letnic et al. 2009, Letnic et al. 2012, Doherty et al. 2019)

Figure 2 – Impacts of dingo presence on ecosystems



2.1 Biology

Dingoes are medium-sized canines, weighing approximately 10–20 kgs. They have pointed ears, a bushy tail, and slender body. Their fur varies between yellow and reddish brown, often with white underparts, paws, and/or tail tips. Dingoes may also have varying degrees of black and white in their coat.

Dingoes share a common ancestry with domestic dogs but form a distinct genetic lineage. Dingoes can interbreed with domestic dogs, producing ‘hybrids’. This interbreeding has led to widespread use of the term ‘wild dog’ as an umbrella term for all Australian wild living canids. However, recent genetic studies have found that hybridisation is less prevalent than previously thought. A 2023 study found that of 171 QLD and NSW wild dogs genetically analysed, 37% were pure dingo, 99% were over 70%

dingo, and none were pure domestic dog[9]. Understanding of the genetic relationship between dingoes and wild dogs and subsequent management actions are rapidly evolving with the advancement of genetic technology.

Dingoes are generalist carnivores. They will change their diets (or 'prey-switch') depending on conditions such as prey availability, climatic conditions, and pack size. In sparse habitats such as semi-arid areas, dingoes eat more reptiles due to their higher availability[10]. In more productive habitats, such as forests, they eat more mammals. When in packs they eat larger animals. They will also eat roadkill and carrion[11]. Occasionally, dingoes prey on livestock, especially small and young individuals, and for this reason they are often regarded as pests. The generalist diet of dingoes makes it difficult to predict how they will interact with prey species in different contexts. Dingoes live in the wild for approximately 3–5 years, with few living past 7–8 years[12].

2.2 Behaviour

Dingoes are pack animals with important social structures. Packs consist of mostly related individuals. The dominant male and female of the pack breed and group parenting, and group hunting of large prey usually occurs. Breeding season typically occurs between February and June. Pair bonding is crucial to the conception and successful raising of young. Breeding and raising of pups occur at den sites, which can be individual or communal[13].

Dingoes can also be solitary, particularly when starting a new pack and/or when social structures are disrupted by culling. Solitary dingoes are more likely to interbreed with wild dogs, hunt smaller prey, and be less effective at supressing foxes and cats[14].

Home ranges are generally large and are influenced by breeding season, sex, prey availability, habitat type, and environmental factors such as drought. Dingoes in areas with high rainfall and diverse prey species may have smaller home ranges (e.g. 2100–2700 ha in forest areas of south-eastern Australia and NSW), while areas that are less productive generally have larger home ranges (e.g. 9580 ha in Western Australia and 6700 ha in central Australia)[15]. In areas with fluctuating resources, home ranges can vary from 9000–30,000 ha[16]. One study in the Brisbane and Sunshine Coast areas of South East Queensland found that dingoes had an average home range of >1700 ha but noted that the home range of dingoes in rural areas is usually even larger, between 2500–8000 ha[17].

Dingoes can be active at any time of day but are generally most active at dawn and dusk. They have been estimated to travel approximately 10–15 km per day[18]. Young males often disperse outside of the area they were born in.

[9] (Cairns et al. 2023)
[10] (Doherty et al. 2019)
[11] (Allen 2010)
[12] (Jackson 2007)
[13] (Smith 2015)
[14] (Corbett 1995, Glen et al. 2007)
[15] (Smith 2015)
[16] (Smith 2015)
[17] (McNeill et al. 2016)
[18] (Allen et al. 2013, Smith 2015)

2.3 Habitat

Dingoes are widespread across Australia and occur in a range of habitat types, from semi-arid to semi-tropical to urban. They prefer habitat with nearby water and denning resources. Denning resources can include caves, hollow logs, and burrows from other species such as rabbits and wombats.

Dingoes can also inhabit urbanised areas. A Queensland study tracked nine dingoes around the Sunshine Coast and Brisbane areas for 5–43 days and found that each dingo remained within 700 metres of residential homes and often visited residential backyards[19]. One of the dingoes lived adjacent to a Brisbane waste facility. Another study found that distance to human structures or activity did not influence den site selection for dingoes inhabiting a large-scale mining operation in Western Australia[20]. Dingoes are often observed scavenging from human waste and can pose a safety hazard to humans, especially when attracted to human sites by food resources.

The suppressive effects of dingoes on foxes and cats are thought to be weaker in productive habitats because home ranges are smaller, opportunities for them to escape (e.g. for cats climbs tree or hide in bushes) are more available, and higher resources result in less competition[21].

Figure 2.3 – Dingos photographed with wildlife cameras on Transport and Main Roads project on the Sunshine Coast

Source: © State of Queensland

3 Direct impacts

3.1 Wildlife-vehicle collision

While there are no studies on wildlife-vehicle collisions (WVC) involving dingoes, international studies have found that most apex predators are impacted by WVC, and these impacts depend mostly on predator richness and movement patterns and road density[22]. Dingoes are known to preferentially use vehicle tracks, roads, and other clearings, and are likely to scavenge roadkill – placing them at a high

[19] (Allen et al. 2013)
[20] (Smith and Vague 2017)
[21] (Glen et al. 2007)
[22] (van der Ree et al. 2015, Quintana et al. 2022)

risk of vehicle interactions[23]. Due to their high mobility, dingoes are likely to cross transport infrastructure frequently. If a road or rail intersects a dingo's home range, dingo-vehicle interactions are more likely not just for one dingo but for several if the home range is occupied by a pack. While dingoes may traverse roads or rail regularly, due to their intelligence and mobility, they are likely to move off roads when vehicles approach, reducing the likelihood of collisions[24].

3.2 Barrier effects

Dingoes are known to frequently use roads and are less sensitive to being out in the open compared to most prey animals, so are unlikely to avoid crossing small roads. They are also highly mobile and thus capable of crossing small and large gaps. Dingoes are likely to avoid roads and railways only if there is high and consistent traffic volume.

3.3 Habitat loss and modification

Dingoes are habitat generalists so can move into adjacent habitat relatively unimpacted if habitat loss and modification occur over a small area. However, habitat changes can impact dingo prey species. Reduced complexity and availability of habitat reduces sheltering options for prey, causing them to be more vulnerable to predation. This may be especially pertinent at roadside verges and habitat edges where predators hunt more efficiently and often[25]. A study in the wet tropics of Queensland found that species that preferentially used forest edges ranked significantly higher in dingo diet than those that did not[26].

3.4 Noise and light pollution

Dingoes can adapt to urban environments, so might not be impacted to the same extent as more sensitive species. Noise could hinder prey detection and pack communication but could also mask dingo movements during hunting. Light pollution could degrade habitat for dingoes and/or their prey, so they are less likely to use the lit area. Further research on the impacts of noise and light are required.

3.5 Indirect impacts

Increased human occupancy in the area after new access roads are constructed may result in increased risk of hybridisation with domestic dogs and dingo-human interactions resulting in culling or deterrence measures. Negative impacts on ecosystem health can have flow-on impacts to dingoes. For example, reduction of prey species abundance in areas can make these areas unsuitable for dingoes.

[23] (Allen 2010, Hradsky et al. 2017, Raiter et al. 2018, Wysong et al. 2020)
[24] (Euan Ritchie, Deakin University, pers. comm.)
[25] (Hradsky et al. 2017, Raiter et al. 2018, Wysong et al. 2020)
[26] (Vernes et al. 2001)

Figure 3.5 – Several Dingoes traversing a dirt road near the Sunshine Coast during a field survey, demonstrating use of tracks and coat colour variation

Source: © Tahlia Townsend, WSP

4 Mitigation

4.1 Wildlife crossing structures

Dingoes are agile and can pass through spaces larger than the size of their head[27]. With no natural predators, they do not require protective measures such as shelter or movement opportunities above the ground to avoid predation. Being large and agile, they can pass through or over crossings with relative ease. Any overpass or underpass large enough to fit a dingo is likely suitable for a dingo to cross without needing additional measures.

Dingoes and other predators can predate fauna at crossings structures. It is possible that predators may preferentially hunt at wildlife crossing structures due to the funnelling effect of fauna fencing and the crossing structures[28]. However, there is limited to no evidence that this occurs systematically across all crossings and negates the value of fencing and crossing structures for wildlife. While dingo presence at crossings may increase predation risk to prey species from dingoes, it may also reduce the predation risk from cats and foxes by deterring them from the area[29]. Regardless, predation at crossings should be assumed, and protective measures for threatened prey species should be applied. These are described in detail in Chapter 6 and include:

- Increasing the number of crossing structures to reduce the risk of predator-prey encounters.
- Providing protective structures within the crossings. These should be sturdy enough to keep predators from the prey. For example, small corridors enclosed on all sides except entry and exit, spiky ‘bush-like’ structures, hollow logs, pipes, crevices.
- Ensuring habitat features provide shelter and protection for prey species between the crossing structure and adjacent habitat.
- Providing raised structures within underpasses for species that climb. Note that foxes, cats, and dingoes are agile climbers. The higher and more species-specific the crossing structure to exclude predators, the better.

[27] (Euan Ritchie, Deakin University, pers. comm.)
[28] (Mata et al. 2015, Mata et al. 2020)
[29] (Burnett and Brook 2020)

Predator control measures such as baiting at crossings are unlikely to be successful, may have unknown flow-on impacts in the ecosystem, and are likely expensive and complex to implement. At the scale of wildlife crossing structures, the best way to manage predation risk is to provide protective structures for prey, not to attempt to reduce predators.

4.2 Fauna fencing

Dingoes are agile and can jump over or move through most types of fencing[30], except wild dog fences (Refer to Section 4.3) and fauna fencing that is as tall as wild dog fencing are the likely exceptions. These fences are not complete barriers but sufficiently hinder movement to be considered effective, and may alter dingo home ranges, behaviour, and interactions with prey. Dingoes and other predators such as African wild dogs have been recorded using fencing to trap prey during group hunting[31]. Increasing the number of crossing opportunities in fenced areas can reduce the impacts of fauna fencing on dingoes and their prey.

4.3 Wild dog fencing

In Queensland there are two types of barrier fences that are approximately 1.8 m tall and are intended to exclude wild dogs from grazing areas (Figure 4.3). These are:

- The wild dog check fence (including rabbit fencing netting at the top for wild dogs).
- The wild dog barrier fence.

While there are anecdotal reports of dingoes crossing the wild dog fences, they are sufficiently effective to justify the continued existence and maintenance in their current design.

If a transport project interacts with one of these fences, the project team will need to seek further information from the relevant fence administrator. Administrators are:

- The local government agency responsible for the wild dog check fence in their locality.
- Biosecurity Queensland for wild dog barrier fences.

Actions will be determined on a case-by-case basis.

[30] (Euan Ritchie, Deakin University, pers. comm.)
[31] (Whittington-Jones and Davies-Mostert 2015)

Figure 4.3 – Extent of wild dog barrier fencing in Queensland

Source: © State of Queensland 2024 Based on [Datasets – Queensland wild dog barrier and check fences, Queensland rabbit fences].

5 Construction

Habitat should be cleared gradually, as detailed in Chapter 7, so prey continue to have somewhere to hide and don't become more vulnerable to predation by dingoes. Construction sites should remain clean with no food resources left in areas accessible to dingoes to avoid attracting dingoes to the site and increasing risk to workers.

6 Maintenance

Collection of kangaroo and other large-bodied carcasses on roadsides should be conducted to prevent / limit scavenging and risk of dingo WVC. Crossing structures and approaches should be maintained appropriately so potential prey species are not exposed to predation.

If management of wild dogs is required to comply with local government agency management programs, it will generally be conducted as a maintenance program in conjunction with regional pest management groups.

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