Submission No 57

INQUIRY INTO DINGOES IN NATIONAL PARKS IN NEW SOUTH WALES

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A submission to the inquiry into Dingoes in national parks in New South Wales

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Executive summary

The management of dingoes is a complex issue. My experience working as both a university-based conservation biologist and Pest Management Officer with the NSW National Parks and Wildlife Service over the last 30 years has provided me with unique insights into the complexity of managing dingo populations in National Parks and the role they play in the conservation of biodiversity. Dingoes are classified as wild dogs in NSW. As such, dingoes are killed in National Parks often with the aim of population eradication in order to mitigate their attacks on livestock on nearby properties. The main method used to kill dingoes in National Parks is the distribution of meat baits impregnated with the poison 1080. However, as apex predators, dingoes are essential for maintaining healthy ecosystems and conserving biodiversity. They do this by keeping the populations of introduced mesopredators (red foxes and feral cats) and herbivores in check. Suppressing dingo populations in National Parks has side-effects termed trophic cascades. Side-effects of dingo control include an increase in the number of introduced mesopredators and herbivores. The flow on effects of increased populations of introduced mesopredators and herbivores are declines in the numbers of small prey species and shifts in vegetation cover. Managing dingoes in National Parks is both a necessity and challenging because of the impacts that they can have on the livestock of neighbouring properties. However, classifying dingoes as wild dogs and killing them in National Parks is detrimental for the health of these ecosystems and goes against one of their core-objectives, the conservation of biodiversity. The answers to this problem will be: 1) to shift our language and call wild dogs what they are, which is dingoes; and 2) to make more use of non-lethal approaches to manage dingoes so that National Parks can be places where we can have healthy dingo populations and harness the beneficial effects that they provide for biodiversity.

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Introduction

The management of dingoes is a complex issue that draws emotive and conflicting opinions from many different sectors within society. The dingo is viewed within society in many different ways including as a noxious pest that kills livestock, as a predator that is potentially dangerous to people and as an iconic native animal. I have been conducting studies on the conservation and management of ecosystems in New South Wales for 30 years and during this period I have worked both as a university-based conservation biologist and as a Pest Management Officer with the NSW National Parks and Wildlife Service. This experience has provided me with unique insights into their status in National Parks, the complexity of managing dingo populations in National Parks and the role they play in the conservation of biodiversity in National Parks.

A major focus of my academic research has been investigating the keystone role that dingoes as apex predators play in the functioning of ecosystems in New South Wales and how removing them from National Parks compromises the conservation of biodiversity. My research on the effects of removing dingoes from Sturt National Park in north-western NSW is described in this 3 minute excerpt from the documentary Australia's Wild Odyssey (https://www.youtube.com/watch?v=2ZDIJ8pDQc0). The full documentary can be found on ABC iView. My concerns with the management of dingoes in National Parks in NSW that I outline in this submission are primarily with the suppression of dingo populations within National Parks and the flow-on effects that this suppression has on the health of ecosystems and biodiversity.

Problem dingoes

Dingoes have been present in Australia for more than 3000 years (Letnic et al. 2012). Due to eradication efforts, dingoes are now absent from most of New South Wales but remain common in some forested regions in the east of the state (Fig. 1). Dingoes still persist but are rare in arid regions of north-western NSW. Dingoes remain common in adjacent landscapes in northern SA and western Qld.

Dingoes have been a problem for the NSW National Parks Service and killed within its National Parks ever since the Service's inception (Fig. 2; Anon. 1976). This is because dingoes inhabit National Parks in many areas of the state and as predators they attack and kill livestock, particularly smaller livestock such as sheep and goats (Anon. 1976). The most widely used method to kill dingoes in National Parks is to distribute meat baits injected with the poison 1080 (Fig. 3,4).

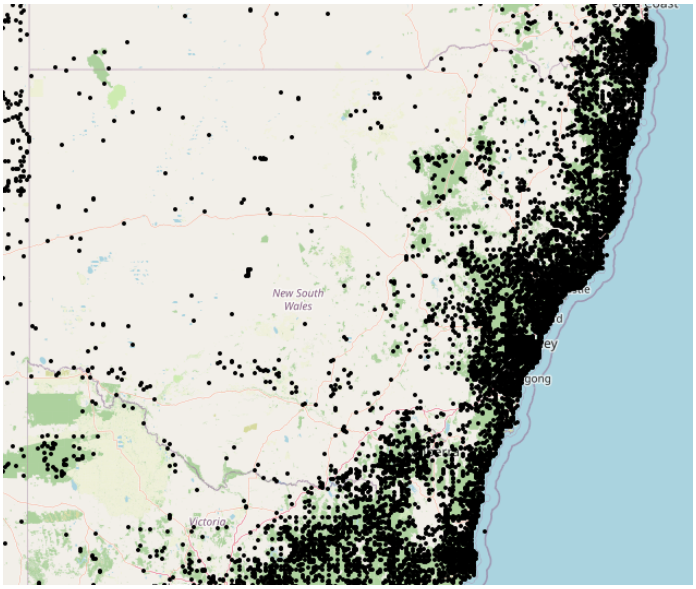

Figure. 1. Records of dingoes from NSW in the Atlas of Living Australia.

Figure 2. Dingoes that have been killed and their carcasses put on display in Sturt National Park.

All dingoes in NSW are managed under the Biosecurity Act and NSW Wild Dog Strategy, regardless of the tenure of the land where they are found. Under this framework wild dogs (including dingoes) are listed as a priority pest throughout the state. Consequently, populations of dingoes in National Parks may be subject to control actions if they are deemed to pose an unacceptable biosecurity threat to neighbouring landholders. In practical terms, this means that dingoes in many National parks are considered to be wild dogs and are killed often with the aim of eradicating their populations. The widespread killing of dingoes in National Parks is evidenced by signs at the entrances of parks providing notification of the presence of poison baits laid for wild dogs (Fig. 4). The signs never advertise that the baits are laid for dingoes even though the majority of wild dogs are from a genetic viewpoint considered to be dingoes (Cairns et al. 2021).

Figure 3. Meat baits injected with poison 1080 about to be loaded into the National Parks and Wildlife Service helicopter prior to an aerial baiting operation. Source: https://vpmsymposium.com.au/base/wp-content/uploads/presentations2018/Grant%20Eccles%201.pdf

Figure 4. Signs at the entrances of National Parks notifying the public of the presence of poison baits laid for wild dogs. The term wild dog encompasses dingoes, feral dogs and their hybrids. The signs never advertise that the baits are laid for dingoes even though the majority of wild dogs are from a genetic viewpoint considered to be dingoes.

Loss of Apex predators generates trophic cascades

As Australia's largest native land-predator, dingoes are the continent's apex predator. Studies conducted worldwide show that removal of apex predators can have far-reaching direct and indirect impacts on ecosystems that contribute to the loss of biodiversity (Ripple et al. 2014). These effects are described as trophic cascades and occur because apex predators play a vital "top-down" role in ecosystems by keeping the populations and impacts of herbivores and smaller predators in check (Ripple et al. 2014). When apex predators are removed from ecosystems, the populations of their herbivorous prey and smaller predators irrupt. In turn, trophic cascades typically become apparent as the depletion of plant biomass and the suppression and even disappearance of species preyed on by mesopredators.

Because they exert their top-down effects on herbivores and mesopredators simultaneously, removal of apex predators can affect a vast number of species and ecological processes, often in unexpected ways. Below we summarize the effects that removal of dingoes has on ecosystems and biodiversity in the National Parks of NSW.

The effect of killing of dingoes on herbivores

The effects that dingoes have on populations of kangaroos, emus and goats is particularly apparent in Sturt National Park in the arid north-western corner of NSW. Here, the border of NSW is demarcated by the Dingo Barrier Fence. The purpose of the dingo fence is to prevent the immigration of dingoes into NSW from Qld and SA. Dingoes are present but rare in Sturt National Park. This is because their populations have been actively controlled using poison baits, trapping and shooting ever since pastoral enterprises were established in this part of the state in the 1870s. Efforts to eradicate dingoes from Sturt National Park have been continuously undertaken since the Park was established in the early 1970s.

The differences between ecosystems where dingoes are rare in Sturt NP and neighbouring lands in SA and Qld where dingoes are common are profound! Kangaroo numbers in Sturt National Park have been observed to be more than 166 times greater than adjacent areas in Qld and SA (Caughley et al. 1980). Emus and feral goats are also much more common in Sturt National Park than neighbouring properties in SA and Qld where dingoes are common (Letnic et al. 2012).

Field studies conducted by my team in Sturt NP show that excessive grazing by over-abundant kangaroos depletes the cover of ground-layer vegetation to such an extent that large expanses of the National Park are just bare ground during dry periods (Fig. 5; Morris & Letnic 2017). Indeed, the grazing pressure from the high kangaroo populations in Sturt National Park is so intense that it can be seen in satellite imagery (Fisher et al. 2021). Landsat imagery shows that there is consistently more bare ground and less - ground cover vegetation in Sturt National Park than neighbouring cattle properties in

Qld and SA (Fig. 5). The reason for this difference, is that the grazing pressure from kangaroos in Sturt National Park is greater than the grazing pressure from livestock and kangaroos combined on the pastoral properties.

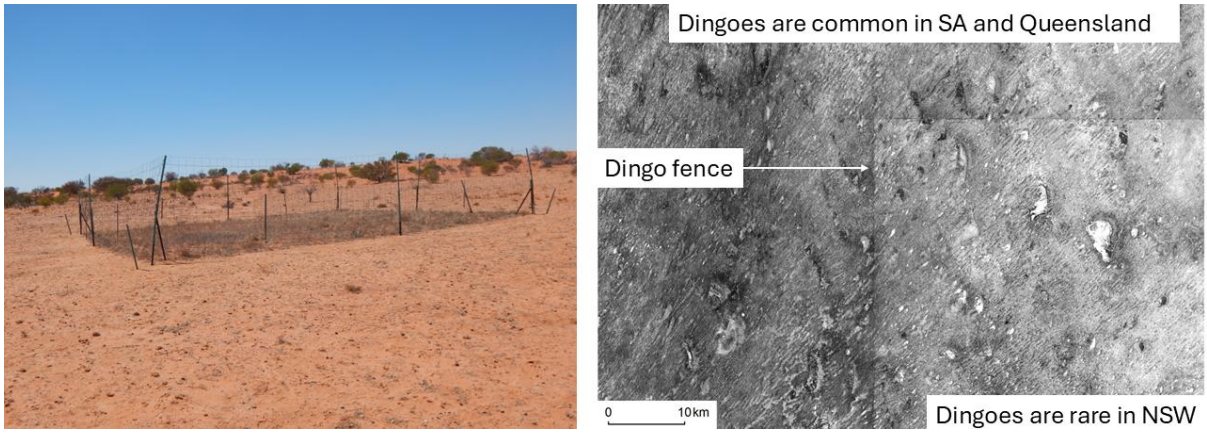

Figure 5. A kangaroo exclosure in Sturt National (March 2018) and a satellite image taken in 1990 showing the dingo fence, Sturt National Park (NSW) and neighbouring pastoral properties in SA and Qld. Darker areas have greater vegetation cover.

Poisoning of dingoes has similar flow-on effects on kangaroos/wallabies and vegetation in the forested national parks in the east of the state. In a 2014 study my team found that wallaby and kangaroo numbers were consistently higher in baited than unbaited parks (Colman et al. 2014). We also found that understorey vegetation structure was sparser in landscapes where 1080 baiting was conducted to suppress dingo population

Killing dingoes lets foxes and feral cats off the hook

The most contentious idea concerning the effects of dingoes on ecosystems is that they suppress the populations of smaller predators (mesopredators) such as the red fox and feral cat. Support for the idea that apex predators like lions and wolves suppress the numbers of smaller predators comes from studies conducted throughout the world and is the premise for a scientific theory: the mesopredator release hypothesis (MRH). The mesopredator release hypothesis predicts that apex predators should limit the populations of smaller predators by directly killing them (Ritchie and Johnson 2009).

The predictions of the mesopredator release hypothesis are borne out in the National Parks of NSW. Studies from National Parks in arid and forested regions of NSW show that red foxes are more abundant in National Parks where dingo populations have been suppressed by 1080 baiting than nearby parks where dingoes are not routinely killed (Johnson & Van Der Wal 2009; Colman et al. 2014; Hunter & Letnic 2022).

The mechanisms via which dingoes suppress fox populations are direct killing and interference competition (Letnic et al. 2012). Evidence of this includes documented instances of foxes being killed by dingoes (Jordan et al. 2023) and the discovery of fox remains in the scats and digestive tracts of dingoes (Cupples et al. 2011; Letnic &

Dworjanyn 2011). There is evidence also that foxes shift their behaviour to avoid overlap with dingoes and that these shifts could compromise their access to food resources (Brawata & Neeman 2011; Leo et al. 2018; Newsome et al. 2026).

The effects that dingoes have on cat populations and behaviour is less clear (Allen et al. 2015). Consistent with the mesopredator release hypothesis, cats are often killed by dingoes and frequently appear in the diet of dingoes (Moseby et al. 2012; Doherty et al. 2019). Also consistent with the mesopredator release hypothesis, studies my team have conducted show that there were more cats in Sturt National Park than in a neighbouring area in South Australia where dingoes were common (Gordon et al. 2015; Feit et al. 2019). However, studies we have conducted in forested National Parks of eastern NSW have found little support for the idea that dingoes suppress cat populations or constrain their activity (Colman et al. 2014; McHugh et al. 2022).

The enemy of my enemy is my friend. Dingoes provide small mammals and ground-nesting birds with refuge from introduced mesopredators

Since the British colonisation of Australia, many ground-dwelling native mammals weighing between (30g-5500g) have gone extinct and many other species are now endangered. Predation by foxes and cats has been identified as the primary threat to these mammals (Johnson 2006). While mammal species falling within the 30-5500 g body weight range are likely to be prey for dingoes, they are more likely to be killed by foxes and cats than dingoes because dingoes prefer larger prey (Doherty et al. 2019). Mammals within this body-size range are likely to receive a net benefit from the presence of "functional" dingo populations because dingoes suppress the numbers and predatory impact of foxes (Letnic et al. 2012). Continental scale patterns in the persistence of native mammals show that their persistence is linked to the presence of the dingo and low presence or absence of the red fox (Johnson et al. 2006).

Field studies which have examined patterns in the abundances of dingoes, mesopredators, small mammals (body weight <50 g) and ground-nesting birds show that dingoes protect these animals from the ravages of foxes and cats. In Sturt NP, where dingo populations are suppressed by baiting, the numbers of small mammals and ground-nesting birds were much lower than on neighbouring properties where dingoes were abundant (Letnic et al. 2009a,b; Gordon et al. 2014; Gordon et al. 2017; Rees et al. 2017; Brawata 2021; Mills et al. 2021). The reason these small prey species benefit from the presence of dingoes is that they are more likely to be eaten by foxes and cats than they are by dingoes (Letnic & Dworjanyn 2011; Sheldon et al. 2023).

My team has found similar patterns in the forested National Parks of eastern New South Wales. In this region, efforts to control dingo populations by laying meat baits injected with the poison 1080 are undertaken in many National Parks, but some National Parks were not baited. We found that small mammals (body weight <200 g) occurred in higher

numbers in unbaited National Parks where dingoes were common than in baited landscapes where dingoes were rare and foxes were common (Colman et al. 2014).

How far do the effects of removing dingoes extend?

In Sturt National Park, the effects of dingo removal also extend to woody plants, the shape of sand dunes and the numbers and diets of predatory birds. As described above, ground-layer vegetation tends to be much sparser in Sturt NP than adjacent cattle stations in SA and Qld where dingoes are common. Conversely, the cover of woody shrubs is much greater on the side of the fence where dingoes are rare including Sturt NP (Fig. 6) This encroachment of woody shrubs has largely occurred since the park was established in the early 1970s (Gordon et al. 2017).

The encroachment of woody shrubs where dingoes are rare is the product of a trophic cascade involving dingoes, mesopredators and dusky hopping mice which eat the seedlings and seeds of woody shrubs (Gordon et al. 2017). There is little constraining the recruitment of woody plants in Sturt National Park because populations of dusky hopping mice are very low due to high levels of predation from foxes and cats. Conversely, where dingoes are common in SA, there are fewer foxes and cats, many more dusky hopping mice and much greater consumption of shrub seeds and seedlings by hopping mice (Fig. 6).

Figure 6. Suppression of dingoes in Sturt National Park triggers a trophic cascade involving foxes, dusky hopping mice and woody shrubs. Images show a dusky hopping mouse, a fox with a dusky hopping mouse in its jaws and an aerial image of the dingo fence along the border between Sturt National Park and a cattle station in South Australia. The aerial image shows the sand-dunes of the Strzelecki Desert and the marked difference in vegetation on either side of the fence.

Further studies by my team revealed that the effects of removing dingoes extend to the shape of sand dunes (Lyons et al 2018). Using imagery taken with drones, we found that the shape of the sand-dunes that dominate the environment there (Fig. 6) differed on each side of the dingo fence due to differences in surface level wind-flows caused by the disparity in shrub density. Specifically, dunes in Sturt NP on the side of the fence where dingoes were rare were taller and more peaked in profile due to greater shrub cover disrupting wind flow which in-turn allows for greater accumulation of sand.

The indirect effects of mesopredator suppression by dingoes also extend to predatory birds. In the Strzelecki Desert, two nocturnal avian predators of rodents, the letter-winged kite and barn owl, were much more common in SA than in Sturt NP because populations of their primary prey species, the dusky hopping mouse had benefited from suppression of mesopredator populations by dingoes (Lee et al. 2021; Rees et al. 2019). The effects that dingoes have on avian predators in Sturt NP also extend to the diets of wedge-tailed eagles whose dominant prey species varies in the presence or absence of dingoes (Brun et al. 2022). In this case, kangaroos were an important component of eagle diets in Sturt NP where dingo populations were actively controlled and kangaroo populations had irrupted. However, where dingoes were abundant and kangaroos were rare, rabbits were the primary prey of eagles (Brun et al 2022).

Managing dingoes should not always entail killing them

Wild dog populations are “managed” in NSW National Parks for two main reasons, to reduce their impacts on livestock on neighbouring properties and to reduce the hazard they may pose to people and domestic animals in and near National Parks. In most instances management actions involve killing dingoes. As described above, killing dingoes in National Parks triggers trophic cascades which have adverse implications for biodiversity conservation and thus undermines the biodiversity conservation objective of National Parks. The most commonly used method to “manage” dingoes is the distribution of meat baits containing the poison 1080. These baits are typically buried along the sides of roads or dropped from helicopters or aeroplanes. Other actions such as trapping, trapping and relocating, and shooting are rarely used in National Parks. One key reason for this is that 1080 baiting is very cost effective. This is because distributing 1080 baits is much less labour intensive than other lethal methods.

One of the great challenges for many local level managers of National Parks that I have met is how to maintain dingo populations and the biodiversity benefits they provide in the core of their parks while reducing (or being seen to reduce) the impacts that dingoes have on their neighbours’ livestock. Achieving this balance often involves baiting for dingoes in buffer zones along the edges of parks but not in the core of parks. However, this “management” while aiming to protect dingoes in core areas of National Parks still involves killing dingoes. Moreover, in many cases, directives from senior management,

such as those which followed the Black Summer bushfires, may require local-area managers to distribute 1080 baits throughout their National Parks.

What is lacking in the tool-box for dingo management in NSW are non-lethal tools to manage dingoes. These non-lethal tools could include the erection of dingo-proof fences along boundaries to prevent dingoes from leaving National Parks or installing fladry (flagging) along boundary fences to deter dingoes from crossing fences (Iliopoulos et al. 2019). There is also research at present investigating the use of sound and scent to restrict the movements of dingoes (Gamage et al. 2026). Another non-lethal tool, that has been shown to mitigate losses of livestock is guardian animals. In this case, trained dogs which are co-located with livestock actively protect livestock from dingoes.

Conclusion

Dingoes are essential for maintaining healthy ecosystems. They do this by keeping the populations of introduced mesopredators and herbivores in check. Suppressing dingo populations in National Parks has side-effects termed trophic cascades. Side-effects of dingo control include an increase in the number of introduced mesopredators and herbivores. The flow on effects of increased populations of introduced mesopredators and herbivores are declines in the numbers of small prey species and shifts in vegetation cover.

Managing dingoes in National Parks is both a necessity and challenging because of the impacts that they can have on the livestock of neighbouring properties. However, classifying dingoes as wild dogs and killing them in National Parks is detrimental for the health of these ecosystems and goes against one of their core-objectives, the conservation of biodiversity. The answers to this longstanding problem will be: 1) to shift our language and call wild dogs what they are, which is dingoes; and 2) to make more use of non-lethal approaches to manage dingoes so that National Parks can be places where we can have healthy dingo populations and harness the beneficial effects that they provide for biodiversity.

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