

**Submission
No 678**

INQUIRY INTO ECOSYSTEM DECLINE IN VICTORIA

Organisation: Association for Conservation of Australian Dingoes

Date Received: 31 August 2020

Submission: August 2020

Legislative Council Environment and Planning Committee

Inquiry into Ecosystem Decline in Victoria

**Association for Conservation of Australian Dingoes (AFCAD)
(A0109166X Inc.)**

**Apex Predator mis-governance in
Victoria and its implications for environmental
stability and species decline**

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The Association for Conservation of Australian Dingoes Inc. (AFCAD)

AFCAD is an incorporated association registered in the state of Victoria. Its purposes are the 'Preservation and Conservation of Australian Dingoes and its habitat and ecosystems' and its objectives include:

'Encourage and facilitate *legislative reform* to ensure the protection and survival of the dingo in the wild';

'Encourage and facilitate government *policy change* to ensure the protection and survival of the dingo in the wild'; and

'*Inform and educate* the public and government about the cultural, ecological and historical significance of the dingo and its conservation'

Submission focus and relevance

The submission addresses issues relating to the decline of Victoria's ecosystems and identifies measures to assist in the restoration of Victorian habitats and populations of threatened and endangered species. It addresses the Inquiry terms of reference relating to:

- a/ the **decline of Victoria's biodiversity**;
- b/the **adequacy of the legislative framework** protecting Victoria's environment – including native species;
- c/ **the adequacy and effectiveness of government programs protecting and restoring Victoria's ecosystems**;
- d/ legislative, policy, program, and **governance solutions to facilitate ecosystem and species protection**, restoration and recovery; and
- e/ **opportunities to restore Victoria's environment while upholding First Peoples' connection to country** in Victoria; and,
- e/ other related matters

The primary focus of the submission is the serious long-standing and ongoing failings of the Victorian government concerning the inadequate recognition and protection of the Dingo (*Canis lupus ssp. dingo*) - Victoria's terrestrial apex predator, and the broader negative implications of this failure for ecosystem stability, resilience and species loss.

Two aspects are considered in turn. One relates to the detrimental impact upon the dingo itself from the current state of policy confusion in Victoria between invasive pest animal management and native species protection. The other addresses the negative ecological implications of dingo mismanagement - for the survival prospects of other native species.

Background

Growing support for dingo protection

The importance of the dingo as indigenous wildlife is reflected in the management objectives of many conservation agencies, which seek to conserve the dingo as part of Australia's natural heritage. The Australian Conservation Foundation has had a detailed dingo conservation policy in place since the 1980s. Foremost amongst these agencies is the Humane Society International, which has included greater protection of dingo populations as a priority in its conservation reform agenda for a number of years. The Wilderness Society has also been an advocate for legislative reform to achieve greater dingo protection over the past decade. The Wilderness Society was included as a stakeholder organisation during extended stakeholder consultations surrounding the threatened species listing for the dingo in Victoria in 2009. Other prominent conservation organisations to advocate improved dingo conservation include the Foundation for Australia's Most Endangered Species Inc. (FAME), the Australian Wildlife Protection Council Inc., Environment Victoria and Help for Wildlife. A number of dedicated dingo conservation organisations have also been established including the Association for the Conservation of Australian Dingoes Inc. and the Save Fraser Island Dingoes Inc.

Over recent years, environmental experts have repeatedly appealed to the Victorian government to fundamentally revise current legislative, regulatory and policy arrangements to provide greater protection to dingoes and conservation value dingo hybrids. The most recent approach was on October 2019, when 26 eminent Australian and international scientists appealed to the Victorian Minister for the Environment to cease aerial baiting for dingoes on environmental grounds.

Dingo threatened species listing

In 2010, accepting a recommendation from the Victorian Scientific Advisory Committee (VSAC), the then Victorian Minister for the Environment, the Hon. Gavin Jennings, listed the dingo as a threatened native taxon under the *Flora and Fauna Guarantee Act 1998*. This was a landmark decision. Threatened species status meant that the dingo governance fell to the *Victorian Wildlife Act 1975*, rather than the pest animal provisions of the *Catchment and Land Protection Act 1994*, under which it previously had been governed as an 'established pest animal', along with feral pigs, goats and rabbits, to be '...eradicated or controlled or its spread in the wild ... prevented' (*Catchment and Land Protection Act, 1994*).

In making this recommendation, the VSAC corrected the misconception, habitually voiced by the farming fraternity, that the dingo was not a native taxon, but an introduced exotic species, which thereby should not be afforded protection. In its final determination on the threatened species nomination for the dingo, the VSAC noted the formal definition of 'indigenous' for the purposes of the *Flora and Fauna Guarantee Act 1988* as '...occurring naturally in the wild in a particular region or locality prior to European settlement' (VSAC, 2007).

However, to facilitate the continued protection of farm livestock from predation, a 3 kilometre 'buffer' was declared at the interface of Crown and private land, within which dingoes could be lethally controlled, despite being listed as threatened under the FFG Act. This was an extraordinary compromise and possibly the only instance of policy provisions being made for the routine destruction of a threatened native taxon.

A serious limitation of the Victorian dingo threatened species listing was that only 'pure' dingoes were included, which meant that dingo hybrids continued to be afforded no protection. All dingo

hybrids, no matter how small the degree of hybridisation, would remain pest animals under the *Catchment and Land Protection Act 1994*. The conservation dilemma thus created has been succinctly expressed by the Humane Society International:

A major problem for those charged with protecting Australian wildlife and particularly the dingo is that there are Acts of Parliament that both protect dingoes and call for their eradication! (HSI)

The reason offered by biodiversity bureaucrats at the time of the listing for the exclusion of even mildly hybridised dingoes was that the protection of hybrids was not legally possible, as hybridisation had been identified as a threat to pure dingoes. Subsequent legal advice, however, found that there is sufficient legal latitude under the *Flora and Fauna Guarantee Act* for the inclusion of hybrids.

Policy progress but no action

Since the Flora and Fauna Guarantee Act listing of the dingo, there has been a number of progressive policy developments in Victoria focussed on dingo conservation.

The Victorian Labor government's 2014 *Policy Platform* committed to putting:

..." in place a statewide biodiversity strategy which includes recognition of the role of native apex predators in maintaining biodiversity" (Victorian ALP, 2014)

More specific policy commitments flowed from this. The Victorian *Biodiversity 2037* policy document included a commitment to ensuring:

...that the roles of important classes of species (e.g. pollinators and native apex predators such as owls, quolls and dingoes) are acknowledged and considered in management planning. (Biodiversity 2037, 14)

Further, *Biodiversity 2037* flagged the prospect of apex predator reintroduction to areas where they have been extirpated to aid in the creation of greater ecological balance:

Managing the population levels of native species to create a more appropriate ecological balance, such as through the reintroduction of apex predators. (Biodiversity 2037, 16-17)

Similarly, the *Biodiversity 2037 Flagship 4* statement expressed a commitment to utilising 'ecosystem engineers' – to 'Helping our native wildlife apply their specialist skills to restore and maintain healthy, functioning environments.' In this context, a commitment is given to:

Maintain existing native apex predators in natural ecosystems and, investigate the potential functional role of reintroduced native apex predators in north-west Victoria. (*Biodiversity 2037 Flagship 4*)

More recently, these policy pronouncements were followed by the commitment in the Victorian Labor government 2018 *Policy Platform* to:

...identify and recognise the *ecological function of dingoes* as part of biodiversity programs and management initiatives (2018 *Policy Platform*, 100) (Our emphasis).

Importantly, the Victorian Labor government 2018 Policy Platform also committed to:

...respect the aspirations of Aboriginal Victorians to protect the dingo as part of their cultural heritage and their stewardship of the natural environment (2018 Policy Platform, 101) (Our emphasis)

This latter policy commitment is not only significant in principle, but in context of recent indigenous mobilisation around meaningful dingo protection, has the potential to facilitate genuine indigenous empowerment and reconciliation. For some Victorian indigenous groups, the dingo is an important totem animal. Recent progress in Victoria relating to indigenous co-management of certain national parks has brought indigenous aspirations for protection of the dingo to the fore. A key example is the April 2018 Draft Joint Management Plan for the Dja Dja Wurrung Parks in north central Victoria. The relevance of such initiatives for significantly improved dingo conservation is discussed further below.

However, as important as these policy pronouncements are, they have not been translated into action. It is no exaggeration to say that, in practice, even ‘pure’ dingoes receive little more protection today than they did prior to their inclusion as wildlife under the threatened species listing.

A primary purpose of this submission is to identify the key reasons for this disconnect between policy and action, and to make recommendations to rectify the current untenable situation.

Section 1 Policy confusion between invasive pest animal management and native species protection

Defining the dingo out of existence

As noted, a fundamental deficiency in the FFG Act dingo threatened species listing from the outset was that it created a lethal legal distinction between ‘pure’ dingoes and dingo hybrids. Dingo hybrids remained delegated to pest animal status. Yet, the distinction is ecologically meaningless because it ignores the issue of apex predator ecological function, the implications of which are outlined in Section 2. More relevant at this point is that the distinction does not adequately reflect the taxonomic reality of what is being either protected or destroyed. The distinction is a legal fiction that in practice undermines dingo conservation, as well as ignoring ecological reality.

The widespread and persistent use of the term ‘wild dog’, including by government agencies in Victoria, to refer to dingo hybrids (no matter how small the degree of hybridisation) simply obscures the genetic reality of what is being routinely destroyed under the pretext of ‘invasive pest animal’ management.

The genetic reality

The fixation on ‘purity’ in relation to dingo conservation has obscured the genetic reality that ‘wild dogs’ in Victoria are predominantly dingo in genetic composition and evidence that they continue to be ecologically important.

The fixation has facilitated misleading claims from the farming lobby and ill-informed politicians that dingoes no longer exist in Victoria, only ‘wild dogs’, and that Victorian farm stock are being killed upon by an introduced, ‘invasive’ predator.

The term also implies that ‘wild dogs’ (predominantly dingo hybrids) present a similar threat to native animals as do foxes and feral cats and need to be lethally controlled accordingly (the falsity is discussed in Section). Disappointingly, this misleading narrative has also been actively disseminated by Victorian public servants, most notably from within the Victorian agriculture bureaucracy.

Around the time of the threatened species listing, the most comprehensive study of dingo genetics across Australia, including Victoria, was conducted by Dr Danielle Stephens in 2011. Dr Stephens’ findings were seized upon by anti-‘wild dog’ commentators to justify the continued lethal destruction of alleged ‘wild dogs’. Such justification, however, was based on a selective and superficial presentation of the findings. Unfortunately, the June 2012 Dingo Threatened Species Action Statement, reported Stephens’ findings in the following terms:

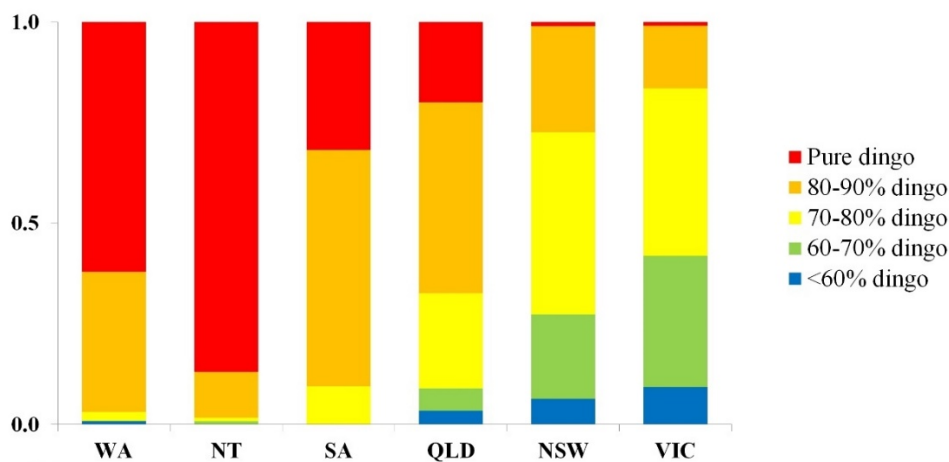
...using tissue samples from 514 canids killed by professional wild dog controllers around pastoral and public land boundaries, as contracted by the Department of Primary Industries over 2009/2010, **only about 1% of individuals were considered to be genetically pure** Dingoes... (Department Sustainability and Environment, 2012) (Our emphasis)

The department’s presentation of Stephens’ findings appears to have been biased by its prior decision to only include ‘pure’ dingoes under the threatened species listing. It is instructive, however, that the Action Statement also cites research conducted by E. Jones in the Victorian Eastern Highlands in 1990, which pointed to a more ecologically sound conclusion:

Jones (1990) concluded that physical changes which had occurred due to hybridisation were relatively minor and that the gene pool was predominantly Dingo in composition. (Jones, reported in Department Sustainability and Environment, 2012, 3)

An unbiased account of Stephens’ findings would have shown broad agreement with Jones. A closer examination of Stephens findings showed that the majority of samples were predominantly of dingo ancestry. Chart 1 is based on Stephens’ findings.

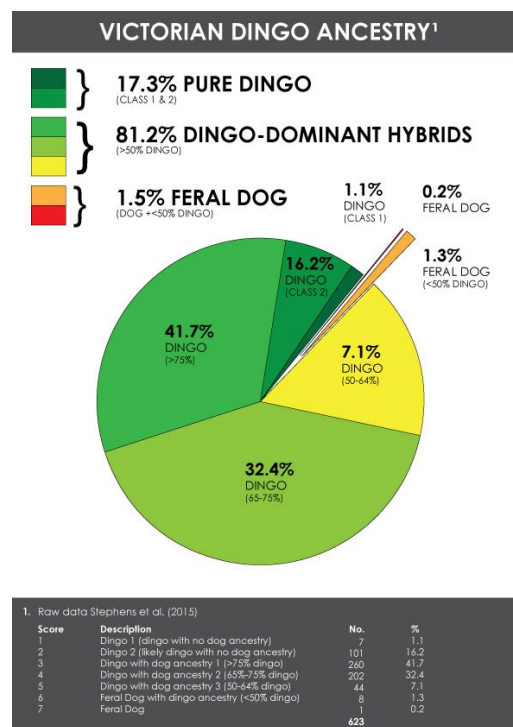
Chart 1 Levels of dingo purity by state/territory



Source: Based on Stephens 2011; Victorian results based on 626 samples, predominantly from eastern and north-eastern Victoria

The chart also shows that an exclusive focus on the proportion of dingoes that may be considered 'pure' is misleading. A more nuanced assessment is more useful from a conservation and ecological perspective. Chart 2 provides a more precise presentation of Stephens' genetic findings. First, the proportion of the sample that can be reasonably deemed to be pure is greater than that commonly presented, including by Stephens herself. Because some microsatellite genetic markers used in the testing are shared by domestic dogs and dingoes, the first two categories of those listed in the chart can be combined to indicate the share that may reasonably be considered to be pure. Again, Stephens chose not to do this. These two categories combined indicate that 17.3% may be deemed pure, not 1.1%. At the other extreme, the proportion of the sample with less than 50% dingo ancestry or no dingo ancestry is only 1.3%. what may be termed dingo-dominant hybrids account for 81.2% of the sample, with more than 50% dingo ancestry. Forty-one per cent were hybrids with greater than 75% dingo ancestry.

Chart 2



Source: Based on Stephens et al. 2015¹

These data are consistent with the recent findings of Cairns et al. (2019) in north eastern NSW who identified that the majority of wild canids were predominately dingo ancestry and feral dogs were virtually absent from the free-ranging canid population.

It is necessary to bear in mind the inherent limitations of the genetic technique involved. Such limitations mean that it would be a mistake to treat the findings too precisely for conservation purposes. A cautionary note was expressed by the geneticist, Dr Allan Wilton, who developed the dingo microsatellite purity testing method which was used by Stephens. Dr Wilton (now deceased) is quoted at length on the limitations of the testing technique used:

Regarding DNA profiling for differentiating dingoes from dogs and hybrids, the testing is complex and it would be a mistake to use too constrictive a definition of what is a pure

¹ Thanks to Ms Melinda Browning who prepared the chart

dingo. It would be impractical if the definition is too strict and it would be scientifically invalid.

The reason it may not be valid is that we cannot easily distinguish between hybridisation and region genetic variation using the test. The test relies on comparison to a reference group of dingoes. If this group is not representative of all dingoes, then any genetic differences will be interpreted as coming from dogs and animals from different geographic regions will be classed as hybrids.

An example of this is the Fraser Island dingoes. Some Fraser Island dingoes would be identified as hybrids under a strict interpretation of the results. Examination of the data show that they have some unique types at some genes and this is the reason for the calculation classifying some of them in group 2 or 3 (which could be interpreted as hybrids).

There are other methods of analysing the data. The computer program... assigns individuals to populations based on their genetic profile. Again, it depends on what parameters are set to do the analysis how the answer comes out. If only 2 populations are allowed and only data from reference samples are used Fraser Island samples would be hybrids. But if 3 populations are allowed and the program assigns the samples to populations, Fraser Island forms its own distinct pure dingo group.

This illustrates the reasons to use a relaxed definition of dingoes when examining purity of animals in the wild. If the scoring alone was to be used, a cut-off of 3Q=0 is recommended. Further analysis of the same data with assignment programs... is also recommended. (Wilton, private communication, July 2011) (Our Emphasis)

Note that the '3Q score of 0] referred to by Wilton represents a purity level of 75% or above.

This caveat should have been heeded for the framing of the dingo threatened species listing. As Wilton's comments suggest, at the very least the listing should have included dingoes that fall within the range of 75%-100% on the microsatellite test as 'pure' for the purpose of conservation in the wild. By ignoring this important qualification, the Victorian authorities consigned a large proportion of dingoes in the wild to invasive pest animal status, to be lethally controlled. Considered in relation to Stephens' findings above, if her sample is considered to be representative, approximately half the dingoes in the wild should have been designated as 'pure', rather than the mere 1% indicated in the Victorian bar in the chart.

Geneticist, Dr Kylie Cairns² has since corroborated Alan Wilton's caveat on interpreting the DNA testing results for dingoes in the wild. Cairns stated:

... applying too restrictive a definition of what a "pure" dingo is would be a mistake. This would be both impractical and scientifically invalid...

This is specifically because it is not possible to distinguish between hybridisation, regional variation and shared ancestral variation using the current dingo DNA testing methodology...

• ² Dr Kylie M Cairns is a research fellow at the Centre for Ecosystem Science in the School of Biological, Earth and Environmental Sciences, University of NSW.

... a relaxed definition of dingoes should be used when examining animals in the wild. In defining what is 'pure' for conservation in the wild, I would recommend the use of a cut-off at $3Q=0$ and the use of additional analysis with programs such as STRUCTURE. A cut off at $3Q=0$ would mean that *dingoes that test 75% or more should be treated as 'pure' for conservation purposes in the wild.* (Cairns, May 2016) (Our emphasis)

The recommendation by Wilton and Cairns that dingo hybrids with 75% or more dingo ancestry be deemed pure for conservation purposes is significant in light of Stephens' genetic survey findings, as this component of the sample accounted for 41.7%, not including the proportion that can be deemed pure. Claims that dingoes no longer exist, or only account for a negligible share of wild canids is demonstrably false.

A further consideration is that Dr Stephens' genetic testing results relied upon the use of a genetic benchmark derived from a sample of dingoes that was biased towards dingoes from Western Australia. This means that the results were likely to exaggerate the degree of hybridisation in South East Australian dingoes – including in Victoria. That is, the degree of hybridisation shown in the Victorian and NSW bars in Charts 1 and 2 above are likely to be overstated.

A further relevant consideration is the ongoing process of evolution in the wild. Ongoing heavy selection pressure likely means that any hybrid variation from the ancestral type is quickly eliminated if it is not advantageous to survival in harsh conditions. In this regard, it is noteworthy that Tasmania, which does not have dingoes, has no feral dog problem as such. Domestic dogs generally cannot survive in the wild, which suggests that Victorian hybrids are qualitatively different from domestic dogs and are functioning as wildlife.

Multiple dingo ancestral lineages -Conservation implications

The validity of the policy distinction between dingoes and 'wild dogs' (dingo hybrids) is further challenged by recent genetic research which finds that the Australian dingo population has descended from more than one ancestral lineage. This finding implies that dingoes in South eastern Australia may not be as hybridised as previously thought. Rather, the genetic differences in dingoes from South eastern Australia, which had been interpreted as hybridisation, may in part be due to the distinct lineage found in that part of the continent:

...there are at least three populations of dingo in Australia: South eastern, North western and Fraser Island. These three populations are distinguishable based upon a variety of genetic markers... Until recently, it was thought that dingoes were the result of a single immigration into Australia and that they formed a single homogeneous population. This view is now evolving... strong evidence of regional geographic variation, suggests the need to be cautious in interpretation of DNA testing methodologies, particularly as the reference population is likely not representative of all dingo populations. (Cairns, May 2016)

The sub-lineages identified occur in two distinct continental subregions, with the line of demarcation occurring diagonally between the Northeast and Southwest of the continent. Not only is it observed that the Southeast lineage is more geographically restricted, but it is suggested that the Northwest lineage may be experiencing geographic expansion at the expense of the South eastern lineage (Cairns and Wilton, 2016).

There are significant conservation implications of these findings in relation to the impact of lethal control upon dingo populations, particularly in south eastern Australia. The authors consider that

these new insights into the origins, multiple migrations to Australia and differential geographic distribution of dingoes need to be taken into account in the formulation of management and conservation plans for the dingo:

This [the different bio-geographic distribution of the two major lineages] is an important finding given the current strong persecution of the dingo in SE Australia and suggests that management and conservation plans need to incorporate information concerning the current population structure of the dingo. (Cairns and Wilton, 2016)

These findings further highlight the inadequacy of current dingo protection arrangements in Victoria. It is now clear that Dingo conservation provisions in Victoria are crucial to the preservation of a distinct lineage of the taxon.

Section 2 Negative ecological implications of dingo mismanagement

Native apex predators are in decline globally. Their loss has far reaching ramifications throughout ecosystems (Estes, 2011; Ripple et al., 2014; Letnic et al., 2011).

Over the past two decades, ecological research around the world has increasingly focused on the importance of the conservation apex predator populations for terrestrial and marine ecosystem health and the preservation of biodiversity. Diminishing apex predator populations have often been associated with ecosystem instability and species decline.

In addition to its ancestral apex predator role, recent research highlights the positive role that dingoes have for small native species which are threatened by recently introduced invasive red foxes and feral cats. Stable, healthy dingo populations, show a suppressive effect on fox and cat numbers and their predatory behaviors. This research indicates that the ecosystem benefits of the dingo observed in arid and semi-arid environments also appear to occur in southeastern Australian forested environments, as in Victoria.

That some wildlife taxa can and do hybridise with a domestic counterpart should not disqualify hybrids (or at least all hybrids) from wildlife status and protection. This principle is widely recognised amongst environmental scientists and precedents exist for the governance and protection of wild hybrids as wildlife. An example is the measures taken to protect the Scottish Wildcat, a native taxon of Scotland, which is subject to hybridisation with the domestic cat (Daniels and Corbett,). The crude policy fiction which separates dingoes from 'wild dogs' ignores a significant body of professional opinion on the issue.

The balance of expert opinion in favour of the view that the protection of dingoes and dingo hybrids is important for responsible environmental stewardship, is now well established. It is not intended here to provide a comprehensive account of this literature, but to simply highlight some key insights. Johnson (2015) stresses that, although Australia once had a diverse suite of large carnivorous marsupials, which paralleled predator assemblages of other continents, the extinction of these native predators resulted in a "drastic simplification of the ecological structure of wildlife communities in Australia." Professor Johnson concludes:

Seen in this light, the dingo is one of the most significant species of wildlife in Australia: it replaces at least some of the ecological function of those extinct large carnivores... it provides a stabilising influence which confers a measure of resilience on native wildlife communities...

we should value the dingo and protect it as part of the natural fabric of Australian ecology (Johnson 2015).

As a highly interactive species (Dickman et al., 2014), the dingo performs the role of an apex predator in ecosystems. A recent account of the ecological role of the dingo states: '*...in the transition from Aboriginal to European Australia the dingo emerged as perhaps the most ecologically significant mammal species on the continent.*' (Johnson 2006).

A substantial body of scientific literature now shows that removing an apex predator from an ecological system can have profound impacts, affecting species richness and abundance (Corbett 1995a in HSI 2005, Fleming 2001, Glen and Dickman 2005, Glen *et al.* 2007, Harden 2001, Johnson 2006, Letnic in de Blas 2009, Soulé 2007, Wallach *et al* 2009a).

In a paper published in *Biological Sciences*, Johnson and colleagues suggest that the rate and number of mammal extinctions in Australia over the past 150 years highlights the relationship between the presence of top predators and populations of smaller predators. When top predators are persecuted and their numbers decline, there are also declines and even extinctions of some prey due to the proliferation of introduced mesopredators - foxes and feral cats (Johnson *et al* 2007). The dingoes' range has contracted greatly since white settlement due to eradication programs. However, if dingoes are removed from an area foxes and cats move in, this could prove disastrous for critical weight range native mammals (Meek and Shields 2001).

The ecological significance of dingo hybrids

It has been often falsely claimed that 'pure' dingoes are now gone from many regions of Australia and will eventually disappear due to hybridisation between dingoes and domestic dogs. However, this view is misguided. Dr Laurie Corbett, an eminent dingo expert, has argued that the replacement is essentially an *evolved* dingo that performs the same or similar ecological functions as previously (HSI 2005).

Conservation therefore needs to be focussed on managing dingoes so that they can fulfil a particular ecological, cultural or economic role (Daniels and Corbett 2003 in HSI 2005). Similarly, Purcell (2009) suggests that it may be better to focus on dingoes' function in ecosystems than focussing on its DNA and physical attributes.

This weight of expert opinion highlights the inherent environmental risk in perpetuating a legal/policy distinction between pure dingoes and dingo hybrids. The current relegation of dingo hybrids to the status of an 'invasive pest animal' simply ignores the weight of scientific opinion, which sees that the lethal control of dingoes and their hybrids is environmentally harmful.

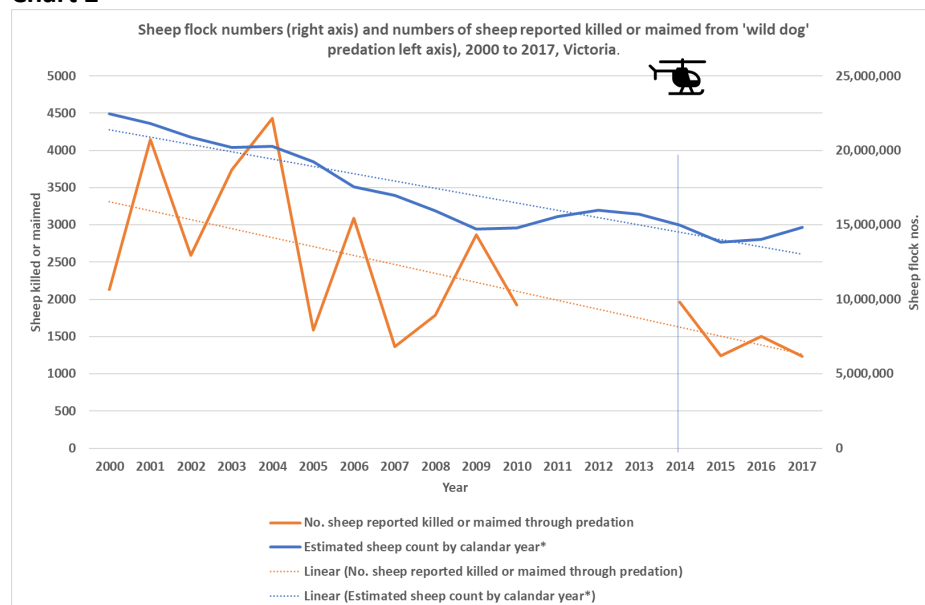
It is now imperative that ecological function be accorded priority over a too narrow preoccupation with genetic purity in relation to dingo conservation which is now held by senior Victorian biosecurity and agriculture bureaucrats. In this respect, it should be noted that the dingo working group (which included farmers), convened on 2009 to advise the Victorian government on the measures associated with the dingo threatened species listing, called upon the government not to rely upon genetic factors alone in deciding the definition of the dingo. Further, the nomination to list the dingo as threatened, lodged in 2007, called for the inclusion of at least some classes of dingo hybrids.

The dangers to the dingo as a taxon and to Victorian ecosystems are now clear and for governments to continue to ignore them would be negligence. Widespread use of poison baiting, which is not target specific, is at odds with Federal and State Government objectives of conserving dingoes, particularly on public lands. Aerial and ground baiting pose a serious risk to the persistence of dingoes (and their genetic identity) across southeastern Australia by increasing the risk of hybridisation between wild dingoes and feral/roaming domestic dogs. Furthermore, it assists the spread of dog genes throughout the dingo population through bottlenecking. If we are to maintain the identity of the dingo, then we must take steps to protect those high dingo ancestry populations we have now and limit future hybridisation. Beyond this, conservation management of dingoes (and ecosystems as a whole) must consider the 'total identity' of animals including their ecological function, behaviour, morphology, alongside their genetic ancestry.

Section 3 Farm stock loss – the facts

In February 2020, under Victorian Freedom of Information legislation, AFCAD Inc. acquired an extensive data set on farm stock loss (killed and maimed) to 'wild dog' predation, covering the years 2000 to 2019. This was the first time that departmental data had been made available for independent scrutiny. Although the data classification used over this period was not altogether consistent, it was nevertheless possible to establish a trend in the scale of sheep lost to predation. This trend data was matched to Australian Bureau of Statistics agricultural data relating to the size of the Victorian sheep flock over the same period. The results are shown in Chart 2.

Chart 2



Although the annual numbers of sheep reported lost to predation vary, there is a clear downward trend over the period 2000 to 2017. The highest numbers reported were 4,147 and 4,431 in 2001 and 2004, respectively. The lowest numbers reported are from recent years: 1,241 and 1,237 in 2015 and 2017, respectively.³

³ The data presented relate to reported stock loss, not confirmed stock loss.

The data show the numbers of stock reported killed or maimed relative to the size of the sheep reported killed or maimed per 1 million sheep in Victoria for the period 2000 to 2017.⁴

Table 1

Sheep reported killed or maimed per 1 million sheep by calendar year, 2000-2017, Victoria	
Calendar year	Sheep killed or maimed
2000	95
2001	190
2002	124
2003	185
2004	219
2005	83
2006	176
2007	80
2008	112
2009	195
2010	130
2011	
2012	
2013	
2014	131
2015	90
2016	107
2017	83

Sources: ABS, Agricultural Commodities Australia, selected years.
DELWP: PAIS, Dogbytes access, Dogbytes mobile and MAX data sets

Although there is some variation from year to year, stock loss rates per million of sheep flock are extremely small. In recent years, from 2014 to 2017, the loss per million sheep ranged from 131 (2014) to 83 (2017). Notwithstanding the downward trend in the numbers of sheep reported lost to predation, as well as a decline in the rate (per million) over the period 2000 to 2017, the sheep loss was very small even at the commencement of the period.

The observation of a longer-term downward trend in reported stock loss numbers is important not only for evaluating the need for lethal 'wild dog' control *per se*, but the reintroduction of aerial baiting for 'wild dog' control by the Victorian Coalition government in 2014 and its maintenance by subsequent Labor governments. This was a major escalation in lethal control. If one were to take the reported stock loss data for the more recent period 2014 to 2017 only, it may appear that stock losses declined thereafter due to the effectiveness of aerial baiting in protecting farm stock. This is what advocates of lethal control have argued, even though the principal advocates (including the Victorian agriculture bureaucracy) have had access to the full data set and know better (National Wild Dog Action Plan, 2020). A longer-term view of the data, however, shows that the decline in stock loss numbers was already under way well beforehand and that further declines in the 2014-2017 period were part of that established dynamic.

Statistical analysis of the data confirms that the introduction of aerial baiting in Victoria in 2014 had no significant effect on stock loss from predation, although evidence indicates that it kills many dingoes (Robley et al.,). To statistically compare the average stock losses and the percentage of stock lost per stock size, we analysed the figures over three time periods. These were 2000-2004, 2005-2013 and 2014-2019. We analysed mean predation numbers, and mean percentage stock lost by Analysis of Variance (ANOVA). Our results show that

⁴ Data for the years 2011 to 2013 are not considered reliable, as this was a time of transition in data classification.

There was a statistically significant decline in predation events prior to implementation of aerial baiting (ANOVA on 2 and 13 degrees of freedom $p < .05$, comparing 2005-2013 and 2014-2019, Tukey's HSD, $p = 0.340$). Our results also indicate that there is no statistically significant decline in the number of stock lost as a percentage of total flock size (ANOVA on 2 and 13 degrees of freedom, $p = 0.12$).⁵

Chart 2 shows that the downward trend in reported stock loss from predation occurred in association with a decline in the size of the Victorian sheep flock. A plausible hypothesis for declining stock loss to predation is that, either directly or indirectly, flock size influences predation outcomes, - perhaps through changes in farm stocking rates. Lower stocking rates may provide reduced opportunities for sheep predation by dingoes. Whatever the case, the principal observation from the data is that stock loss to predation has been low historically and remains very low in Victoria.

When the geographically uneven nature of predation is taken into account, the stock loss rates are still relatively low. Data in Table 2 show that, for the Victorian regions of Gippsland and Hume in eastern Victoria, predation rates are higher than the Victorian average - 1 sheep in every 1,000 is lost to predation. However, these farming areas are situated close to important dingo habitat and biodiversity regions and responses to stock losses need to be tempered by environmental concerns, particularly given that these regions only account for approximately 7 per cent of Victoria's total sheep/lamb stock. Therefore, these higher predation rates only apply to a relatively small proportion of Victoria's farms and sheep farm stock.

Table 2

Recent stock predation rates, Gippsland and Hume regions, Victoria

Region	No. sheep/lambs reported lost to predation##	No. sheep lambs #	Loss rate
Gippsland*	590	558,737	0.11
Hume**	364	323,001	0.11

Sources: # Stock numbers taken from Australian Bureau of Statistics, 71210DO003_201415 Agricultural Commodities, Australia-2015-16

Reported stock lost taken from DEWLP August 2017 (for period 2016-17)(See references)

* Victorian government region of Gippsland approximated through combining National Resource management Regions - West Gippsland and East Gippsland

** Victorian government region of Hume is approximated by use of National Resource management Region - North East

It should also be noted that reported predation in western Victoria (15 stock lost) is economically negligible and the case for lethal control, including a bounty, in that part of the state is unwarranted.

It is important to understand that the decline in the size of the Victorian sheep flock over the past two decades has not been due to wild dog predation forcing farmers to give up sheep farming, as has been sometimes claimed. The reduction in Victoria's sheep population over recent years has reflected a changing emphasis within the industry from wool to meat and alternative farm

⁵ Special thanks to Mr Kevin D. Newman, BSc Honours (Zoology/Statistics)

management practices. It has also reflected changes in the international market for sheep products. A 2014 sheep industry report stated:

There has been significant adjustment in the industry over the last two decades, with the flock size falling by a third, from 23.4 million head in 1993-94 to 16.1 million head in 2012-13. (DEDJTR, 2014)

‘Opportunity cost’

An argument frequently relied upon by advocates of wild dog control, including the Victorian government agriculture bureaucracy, is that the direct cost of stock loss from predation is only part of the overall cost to farming. It is maintained that, because of the predation threat to farm stock near to the public estate, farmers choose not to utilise such land to its full potential, thus incurring an ‘opportunity cost’, which in Victoria is currently claimed to amount to 16 million dollars or more annually. The source for this argument is a consultancy by Lightfoot prepared in 2010.

The plausibility of this argument is challenged by the stock loss data presented above, which shows historically low levels of predation. Nevertheless, this argument is flawed on practical and ethical grounds.

First, the evidence for what farmers *actually do* as compared to what they might *otherwise do* in different circumstances is fraught with guesswork and inherent uncertainty. Perhaps more important is this line of argument’s ethically simplistic and even anti-social nature. In all modern societies, where different and competing vested interests are moderated through legislative, regulatory and customary restraints, every person and collective entity is by necessity subject to ‘opportunity costs’ in differing degrees. No one is free to operate their business or behave individually completely as they wish. While everyone could potentially try to calculate their personal opportunity cost, in financial terms, from having to live in an ordered, regulated society, few would consider it rational to do so. The benefits of living in a regulated, predictable and safe society, where harmful excesses are banned or at least curtailed are for the most part intuitively appreciated. Yet, extreme elements within the farming lobby, unfortunately often supported by governments, calculate their collective opportunity cost at the expense of responsible environmental management, as if their special interest is paramount to all others.

Moreover, the actual opportunity cost figures frequently cited by farm lobby extremists and the Victorian agriculture bureaucracy only amount to an infinitesimal share of the financial scale and profitability of the livestock farming industry.

Section 4 The ‘wild dog’ myth

Official justifications for large scale, lethal ‘wild dog’ control programs typically focuses on the need to protect farm stock (mainly sheep) from predation, and to mitigate against other, alleged economic losses to the farming sector. Less frequently, biodiversity conservation reasons have been alleged as well.

Governments have directed and/or conducted such lethal control, deploying poisons, trapping and shooting from the early colonial period, when sheep grazing was first introduced. A zero-tolerance colonial mind set towards the native dog – the dingo, is illustrated in the early history of Port Phillip, even prior to it becoming an officially sanctioned colony. At the first public meeting by colonials at what would become Melbourne, on June 1, 1835, the first binding collective decisions were to

prevent aborigines acquiring firearms and the payment of a 5/- shillings bounty to 'the killer of every wild dog' (Boys, 1935).

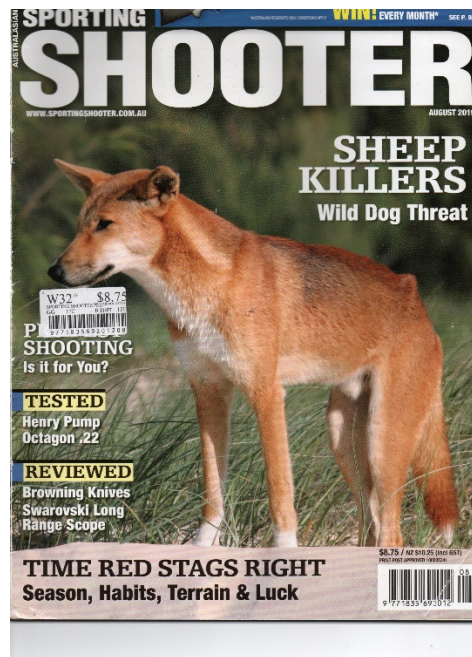
The data stock loss data examined above for Victoria leaves government, farming industry and poison industry advocates for lethal control with a major credibility gap, between their claims about the necessity for the expensive, ongoing and widespread lethal control of 'wild dogs' and the reality of historically low and declining levels of stock loss to predation in Victoria. A more complete explanation of the cultural, institutional, and political evolution of this disjuncture would require a detailed analysis in its own right – the subject of another paper. At this point, attention is limited to a description of governmental and farming industry myth making about the 'wild dog' threat and the use of this mythology to obscure the lack of substantive justification for current policy, which is focussed on lethal control.

Unfortunately, a salient feature of the present situation in Victoria is the close fit between government departmental discourse on 'wild dogs' with that of farming representative organisations and associated vested interests which materially benefit from lethal control. This lockstep approach to the perpetuation of the 'wild dog' narrative calls into question the independence of government authorities and the quality of governance on the issue.

The institutionalised fiction that dingo hybrids, in being 'wild dogs', are an 'invasive pest species' appears designed to mislead - to desensitise the public to the reality that their government actively encourages and orchestrates the routine killing of a native animal. Government agriculture bureaucracies share a tightly controlled and largely unchallenged 'wild dog' narrative with farming representative organisations and other vested interests. At one level, this demonizing narrative, through sheer assertiveness and constant repetition, serves to supplant rational, factually based policy development. At another level, this lockstep approach to the 'wild dog' narrative facilitates the manufacture of public consent for something that would otherwise be perceived as odious and unacceptable. In this case, it is the ongoing wholesale destruction of a native animal - the dingo.

The confusion created around the legitimacy of the dingo and dingo hybrids as wildlife by this pervasive 'wild dog' narrative has provided the basis for two further claims by lethal control advocates. One is that the killing of 'wild dogs', as 'invasive pests', is a biodiversity conservation measure. 'Wild dogs' are cast into the same category as feral pigs, foxes and rabbits, which are widely accepted as environmentally destructive. Second, as the narrative systematically undermines consideration of dingoes and dingo hybrids as indigenous, the further claim by the farming sector, that the eradication of 'wild dogs' is at once good for farm productivity and protection of the natural environment, is rendered plausible to an ill-informed public.

A particularly worrying aspect of the 'wild dog' myth is that it encourages recreational hunters to kill dingoes in the mistaken belief that they are helping to remove invasive pests and are thereby performing an ecosystem service. As mentioned elsewhere in this submission, this situation applies not only to areas in Victoria where the 'wild dog' bounty applies, but more widely.



Typically, the dingo as a native taxon is either subsumed under the rubric, 'wild dog', and its wildlife status denied or obscured, or an abstract, hard distinction is made between dingoes and 'wild dogs' and one pitted against the other.

The legal context in Victoria, which now protects 'pure' dingoes as threatened wildlife, but continues to condemn dingo hybrids (no matter how little the introgression of domestic dog genes) as 'invasive pest animals', illustrates the latter approach. As discussed below, this distinction has encouraged the perverse view that killing 'wild dogs' helps in the preservation of 'pure' dingoes, allegedly because it helps prevent hybridisation. Perhaps it is not surprising that this claim has been at times disingenuously picked up by government agriculture authorities, and by lethal control advocates in the farming sector and the poison industry, thereby falsely acquiring the mantle of environmental responsibility.

The extended quote below is from a 2010 media release by the Victorian Nationals Party, which encapsulates key elements of the carefully stage managed 'wild dog' mythology.

Victorian Liberal Nationals Coalition Government will use aerial baiting to control wild dogs and *protect livestock and native fauna*.

Aerial baiting is a crucial control method that has been rejected by the Brumby Government.

Under John Brumby, *wild dogs are taking over Victoria's high country and cutting a bloody swathe through native animals and livestock*.

A Coalition Government will carry out an annual aerial baiting program to *control packs of marauding wild dogs* in Victoria's high country.

We will bring an end to *the incompetence of the Brumby Government* on wild dogs and its *refusal to implement aerial baiting*.

The Victorian Coalition is not going to sit on its hands and watch *while native wildlife and the livelihoods of landholders are wiped out by these brutal feral animals...*

Farmers are suffering huge losses, with some so devastated by the attacks that they have given up farming altogether.
(Nationals 2010)

This media release was issued just prior to the November 2010 Victorian state election, which was lost by the Brumby Labor government, and at the time when the Brumby government was putting the final touches to listing pure dingoes as a threatened native taxon. In part, the reference to the ‘incompetence’ of the Brumby government alludes to the listing of the dingo as threatened, a measure which was fiercely opposed by farming representative organisations, such as the Victorian Farmers Federation. A common argument put forward by the farming lobby up until the Victorian government’s dingo threatened species listing was that dingoes were not native to Australia, but an introduced feral pest. Fortunately, the listing made this position more difficult to sustain publicly.

It is notable that the Nationals also berate the Victorian government for not conforming to the more extreme ‘wild dog’ control practices in other states (Nationals 2010). It has become a common tactic by lethal control advocates to criticise the Victorian government for ‘lagging behind’ other jurisdictions in pest animal management. The demand for national conformity has become a key plank of the ‘wild dog’ narrative. For instance, the current Victorian government is criticised for aerial baiting with 10 baits per linear kilometre, not at 40 baits, which is the usual practice in New South Wales. The aim of using 40 baits is to crush dingo and dingo hybrid populations, destroying up to 90 per cent.

The principal causes of sheep/lamb loss

The habitual exaggeration of the impact of dingoes (‘wild dogs’) upon farm stock – predominantly sheep and lambs, is exposed by research into the main causes of lamb loss in eastern Australia. Recent research conducted by the NSW Department of Primary Industries, by Dr Gordon Refshauge, noted that lamb survival rates had not changed in over 100 years. The ‘core’ causes identified were long birth times, gestational growth restrictions, and poor lamb growth due to low milk yield. Other causes identified were Dystocia and birth injury (48%), Starvation and mismothering (25%), and predation (7%) (NSW DPI, 2015). It is notable that this research does emphasise ‘wild dog’ predation as a significant cause of lamb loss. The type of predation is not specified. This is significant because fox predation of lambs is commonplace and it cannot be assumed that predation relates solely to ‘wild dogs’, or dingoes.

Recommendations to improve lamb survival did not include measures related to predation. Rather, the emphasis was upon issues related to improved ewe condition, pasture availability, supplementary feeding, mob size and paddock shelter (NSW DPI, 2015). Clearly, the major threats concerning lamb survival relate to animal husbandry.

Section 5 The scale and impact of lethal control

The evidence presented above shows that there is no convincing case for routine, widespread lethal control of dingoes and dingo hybrids in terms of farm stock protection from predation. Predation rates have been low historically and have been declining over the past 20 years. Frequent claims by elements from the farming lobby, Victorian agricultural bureaucrats and vested interests within the poison industry, that ‘wild dogs’ cost the state millions of dollars annually are not credible. Such claims are derived from a dated consultancy which is empirically and ethically questionable.

Evidence has also been provided of a significant body of expert scientific opinion that the widespread, routine lethal control of dingoes and dingo hybrids is environmentally harmful, and has likely been a factor in native species loss, particularly in the mid-weight range.

Yet, the scale of lethal control of dingoes in Victoria has never been greater. Table 3 provides an indication of the annual scale of lethal control.

Table 3

Wild Dog control, 2018-2019, Victoria								
Wild Dog Management Zone (WDMZ)	Public land (ha)	3km Unprotected (ha)	Private (ha)	Fulltime 'Wild Dog' Controllers	Trap night capacity	DELWP 'Wild Dog' Program Targets 2019-2020	Community 'Wild Dog' Control Targets	
						Targetted Ground Baiting Transects to be baited (km)	Private Land Baiting Landholders	Baits to be laid 2019-2020
Alexandria	124,945	57,488	59,341	1	3,000	52		
Big Desert & Wyperfield	745,284	209,565	627,037	Not reported		272		
Bonang, Bendock, Tubbut & Deddick	119,426	67,349	42,571	1	3,000	137	21	4,735
Buchan & Gelatipy	190,673	108,350	46,739	2	6,000	Not reported	5	400
Burrowye, Granya & Walwa	42,757	38,787	60,907	1	3,000	Not reported	7	760
Corryong	120,298	79,101	77,507	1.5	4,500	Not reported	3	250
Dargo & Bairnsdale	203,882	104,024	59,135	2	6,000	Not reported	12	1,250
Gembrook, Noojee & Erica	286,985	156,280	89,560	1	3,000	Not reported	N/A	N/A
Licola, Heyfield & Maffra	176,279	74,478	46,400	1	3,000	Not reported	N/A	N/A
Mansfield	132,075	90,523	116,380	1	3,000	Not reported	N/A	N/A
Mitta Mitta & Sandy Creek	100,865	64,145	36,970	1	3,000	Not reported	N/A	N/A
Omeo, Swifts Creek, Ensay & Benambra	255,870	176,981	135,941	2	6,000	Not reported	N/A	N/A
Orbost & Cann River	186,134	96,322	23,217	1	3,000	Not reported		
Ovens	226,085	159,087	94,630	1	3,000	Not reported	13	1,100
Tallangatta	60,076	39,191	38,732	1.5	4,500	Not reported	1	60
Whitfield	112,729	73,044	122,729	1	3,000	Not reported	N/A	N/A
TOTALS	3,084,363	1,594,715	4,679,078	18.00	54,000	461	62	8,555

Source: Agriculture Victoria - <https://agriculture.vic.gov.au/biosecurity/pest-animals/managing-wild-dogs-in-victoria>
Special thanks to Ms Melinda Browning - data collation and preparation.

The data, for the year 2018-2019, indicate extensive poison baiting and trapping on both public and private land. Across the wild Dog Management Zones, the data indicate 54,000 trap nights, and 461 kilometres of ground baiting transects. The data indicate that a staggering 51.7% of public land Victoria is subject to lethal control for dingoes ('wild-dogs'). Although the idea of a 3 kilometer buffer at the interface of public and private land sounds marginal, it is not.

Significantly, the data include 'community wild dog control targets. Community baiting programs have been promoted by the Victorian pest management bureaucracy as a means of building positive public relations with farming communities. This followed a period when these relations were poor. Community baiting events are also deemed important for 'community building' amongst rural populations. These programs are problematic, however, from a dingo conservation and environmental perspective because both rationales can operate independently of any concrete need for stock protection from dingo predation. AFCAD contends that 'community building' and departmental public relations rationales based on lethal dingo control have taken on a life of their own.

It is frequently stressed that lethal control of dingoes and 'wild dogs' in Victoria is limited to the 3 kilometer 'buffer' zone at the interface of private and public land. In reality, the negative environmental impact of lethal control goes well beyond this buffer zone.

Furthermore, the geographical reach of lethal control now routinely extends well beyond 3 kilometers in many locations. When the Liberal Coalition was returned to government in Victoria in December 2010, it set about weakening the protections put in place under the dingo threatened species listing by the Brumby Labor government. One action was to weaken the 3 kilometer limit on lethal control. Annual work plans were introduced in consultation with landholders, which provided for negotiated lethal control beyond 3 kilometers. The Border Mail in September 2014, reported:

Victorian Agriculture Minister Peter Walsh has said the buffer zone is no longer relevant... The dogmen will now be able to carry out their eradication activities further in the bush on Crown land...

The department laid more than 21,000 baits and community wild dog control groups deployed a further 33,000 baits. (Border Mail, Sept 8, 2014)

Agriculture Minister, Peter Walsh is quoted as saying:

The government recognises the key to making ground in the war against wild dogs is sensible and flexible management and during the last 3½ years we have acted to bring common sense back to wild dog management. (Border Mail, Sept 8, 2014)

At this time, there was also a shift in emphasis in the delivery of lethal control from a reactive to a pre-emptive approach. Lethal control would be escalated and maintained at a high level regardless of the actual level of threat to farm stock. At the time of the final adoption of the threatened species listing in 2010, it had been agreed that lethal control would be primarily reactive with response being to actual predation upon farm stock. Under Minister Walsh, by contrast, the very presence of dingoes in habitat near farms would be treated as a threat.

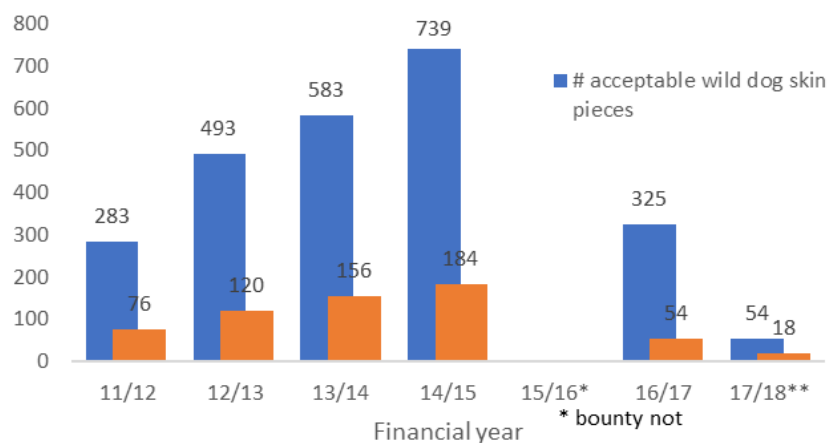
This altered approach found expression with the introduction of aerial baiting in 2014, which would be delivered on a routine basis. The Coalition government also established a Wild Dog Management Advisory Committee, comprised of landholder and farming organisations, including the Victorian Farmers Federation. Lethal control advocates were thereby given privileged relevance and influence. A 'wild dog' bounty was also introduced, which encouraged recreational shooters to participate in the destruction of dingoes ('wild dogs').

With the return of a Victorian Labor government in 2014, the previous government's weakening of the threatened species protection arrangements continued. Aerial baiting was continued, as was the 'wild dog' bounty (belatedly) and the annual 'wild dog' plans. The continuation of the 'wild dog' bounty was likely a political gesture to two Victorian upper house members from the Fishers, Shooters and Farmers Party, upon which the Labor government wished to garner political support.

The Wild Dog Management Advisory Committee was also re-established, which again provided lethal control advocates and poison industry interests the opportunity for special influence over government pest management decision making. The committee, which was discontinued in 2020, was, in AFCAD's view, seriously dysfunctional in its incapacity to offer dispassionate, objective advice to government ministers, being characterised by chronic confirmation bias throughout its deliberations. This confirmation bias coloured its advice to Ministers and, AFCAD believes, at times mislead ministers.

The two areas where this Committee exercised particular influence upon government decision making were aerial baiting and the 'wild dog' bounty. As an indication of the impact of the bounty upon dingoes, as of the end of 2017, 2,477 bounties had been paid for dingo ('wild dog') scalps in Victoria as of 2011, at an expense to the state of half a million dollars.

Chart 3 Wild dog bounty collection figures from 2011/12 to 2017/18



To provide an indication of the potential environmental impact of these figures, recent research found that the density of dingoes/dingo hybrids in the Victorian natural environment to be in the order of 2.6 per 100 square kilometers. After baiting, the density had been reduced to 1.9 per 100 square kilometers. Such low densities for apex predators are not unexpected. Nevertheless, the measured impact upon these densities from baiting is disturbing (Robley et al. 2018). It represents a reduction in apex predator density within the landscape of 73%. The negative impact on apex predator function must become a major concern in areas subject to lethal control of this intensity.

A further consideration is the impact of recreational hunting of dingoes/dingo hybrids that is not eligible for the bounty. Technically, only scalps taken from within the 3 kilometer buffer are eligible for the bounty payment. However, the hunting of 'wild dogs' is allowed over a much larger part of Crown Land. Not only does this invite abuse of the terms of false claims on the bounty, but makes a nonsense of the 3 kilometer buffer, which is intended to protect dingoes protected under the threatened species listing. Although government control staff are restrained in deploying lethal control beyond 3 kilometers of the private-public land interface, recreational hunters can hunt beyond the 3 kilometers with immunity, so long as they are notionally hunting 'wild dogs'. This is absurd because, even as the agriculture bureaucracy admits, pure dingoes and dingo hybrids are usually visually indistinguishable.

An indication of the scale of aerial baiting within the six designated areas where the federal government has granted permission is found in the DEWLP 2019 operational report on aerial baiting. It states that, in October 2019, transects equally 429.8 kilometres were baited and 3,978 baits deployed (DEWLP, 2019)

The Victorian SAC identified 'wild dog' control as a threat to dingoes

The evidence shows that lethal control of dingoes has continued on an increasing scale and intensity in Victoria. This has occurred even though the Victorian Scientific Advisory Committee in June 2007, in recommending the listing of the dingo as a threatened native taxon, advised the Victorian government that lethal control programs constituted an ongoing threat to dingo populations in Victoria:

Criterion 1.2 The taxon is significantly prone to future threats which are likely to result in extinction.

Evidence:

Remnant populations of dingoes are subject to loss of genetic integrity through hybridisation with wild dogs *Canis familiaris familiaris* (Newsome and Corbett 1982, 1985; Wilton 2001; Elledge et al. 2006). The increased frequency and intensity of bushfire in remaining habitat areas, **and wild dog control programs (including baiting and other control measures)** have the potential to result in a decline in remnant dingo populations and recruitment to those populations. (VSAC, 2007)(Our emphasis)

Section 6 The Indigenous cultural significance of the dingo

Adequate conservation of the dingo in Victoria is also imperative because of the taxon's unique cultural significance in universal terms and for its special cultural significance to Indigenous Australians. Any unnecessary destruction of the dingo represents a continuing dimension of Indigenous dispossession. The dingo is a totem animal for different Indigenous groups in Victoria, and the continued persecution of the taxon needs to be considered in this context.

The universal cultural significance of the dingo

Genetic research identifies the dingo as an ancient semi-domestic taxon, which in prehistory underwent a rudimentary degree of domestication, but then remained suspended in this transitional state. As such, it may be thought of as a 'fossil dog'. While modern dog breeds (*Canis familiaris*) may be considered the fully domesticated descendants of ancient wolves, research suggests that the dingo (*Canis dingo*) represents humankind's first attempts at animal domestication, possibly prior to the widespread domestication of plants and animals associated with the adoption of sedentary life and agriculture. In this respect, Mattias et al. (2011) conclude that:

"... Australian dingoes and Polynesian dogs originate from dogs introduced to Indonesia via Mainland Southeast Asia before the Neolithic."

And,

"The mtDNA data suggest that dingoes arrived earlier than indicated by the archaeological record, before the arrival of the Neolithic to the surrounding regions."

Johnson (2006), acknowledging that living dingoes represent the an early stage in the process of domestication, suggests that, because of this, the dingo's rapid expansion over mainland Australia may have been assisted by the aboriginal population (Johnson 2006: 149).

The late Dr Alan Wilton, co-author of international genetic research published in the journal *Nature*, in 2010, reported that the Australian dingo and the New Guinea Singing dog "...are the most closely related to wolves and may be most like the original domesticated dog as it was across Asia and the Middle East thousands of years ago" (UNSW, 2010).

The dual status of the dingo as indigenous wildlife and as an ancient pre-neolithic semi-domestic, closely linked to human pre-history and migration in the South Pacific and South East Asian region, gives it universal heritage significance. Recognition of this universal significance becomes more compelling once the special significance of the dingo within Australian indigenous culture is appreciated.

The information below describes the prominence of the dingo in Australian Indigenous life and culture. The discussion begins with the entry of the dingo into Indigenous life in Australia during the late Holocene period, from approximately 5 thousand years ago – a period of significant technological, social and cultural upheaval in Indigenous life across the Australian continent. The contemporary significance of the dingo to indigenous Australians is, in large part, the product of its integral role in the cultural and economic dynamism of the late Holocene.

The late Holocene, Indigenous cultural change, and the dingo

During the first part of the Holocene, from approximately 10 to 6 thousand years ago, evidence suggests an increase in indigenous population. While rising sea levels (which had stabilized by 6 thousand years ago) appear to have displaced coastal populations, thereby creating greater population pressures further inland, there also appears to have been an overall increase in population in this period (Johnson 2006). This is seen by many experts as puzzling as this was also a period of climatic change which saw a return to a somewhat drier, cooler climate and the greater aridity in parts of the continent. Something else seems to have been occurring to explain population growth rather than decline under less favourable conditions.

It is clear that, from after 5 thousand years ago, population growth was accompanied by a number of other radical changes to indigenous life. As indicated, these changes were technological, social and cultural in nature. After an extremely long tenure on the Australian continent during the Pleistocene, during which the technological 'tool kit' of the indigenous population appears to have been relatively simple and stable, there was now the sudden appearance of many new tool types in what is commonly referred to as the Australian Small Tool Tradition. This consisted of smaller, higher quality specialized stone tools, which were often acquired by trade over long distances between indigenous groups (Johnson 2006). These tools became widespread from around 4 thousand years ago.

In turn, this technological shift was associated with an intensified use of the natural environment, including the use of a broader range of plant and animal species. Smaller animals were increasingly relied upon, as well as a greater reliance upon the harvesting of seeds and grasses from which a durable bread or biscuit was made. In places, such as in western Victoria, something closer to a sedentary lifestyle emerged in association with these changes. Significantly, Johnson notes that this period was also characterised by the expansion of indigenous populations into regions that were previously marginalised, including the sandy deserts of central Australia (Johnson, 2006).

Not only did this period see a more intensive and managed use of the environment, but greater interaction between indigenous peoples. This is found in evidence of larger gatherings and more extended trade. It was also accompanied, perhaps counter-intuitively, by more closed societies and more highly defined territories entailing more developed, formalized systems of alliances and exchange between neighbouring groups (Johnson 2006).

Taken together, these changes are often referred to as the Holocene revolution in the indigenous way of life. There has been considerable discussion about the role of the dingo in this cultural and economic transformation because, on balance, the evidence strongly suggests that the dingo arrived on the Australian continent at the outset of the late Holocene period when the great change gained momentum. Expert opinions vary as to which aspects of the transformation were causative and which were dependent, and the role of the dingo is part of this debate.

Flannery (2004) puts forward an interpretation of events which places the dingo centre stage as an influential factor in the late Holocene indigenous revolution. Indeed, he refers to it as the 'dingo driven revolution' (Flannery 2004: 188). Building on the perspective of Jones and Evans (1997), Flannery contends that, at the time of the dingo's introduction, the advantage accruing to indigenous Australians in the hunting of game was likely greater than observed after European settlement. As with other examples of recently introduced predators (such as foxes or domestic dogs in Tasmania – where there are no dingoes) Flannery argues that indigenous fauna would not have yet learned to fear the dingo and to evade it. In particular, smaller marsupials, which increased in significance as part of the indigenous diet at this time, would not have yet adapted to the scent and sight of the dingo. These circumstances may have bestowed a distinct advantage to the dingo's 'adopted' human family. Significantly, in effect, Flannery argues that the dingo may have functioned as part of the new technological suite utilized by indigenous Australians and, as such, was a significant agent of economic and cultural change.

This interpretation fits with the profound linguistic shift in indigenous language that occurred during the late Holocene. Observing that languages can spread quickly in association with the spread and adoption of new technologies, the spread of the dingo may be linked to the rapid adoption of the Pama-Nyungan language from the north to the south of the continent in the late Holocene (Flannery 2004). The fact that post-European settlement observations of the role of the dingo in hunting suggest its role may have been relatively limited (Johnson 2006; Gould 1970; Hamilton 1972) does not detract from Flannery's contention that its role in hunting was likely to have been far greater at the beginning of the late Holocene.

The ability of the dingo to facilitate hunting aside, there is no doubt that it occupied a prominent position in Indigenous Australian spirituality. Indeed, relative to other animals, the dingo is over-represented in indigenous Dreaming mythology and is "associated with the supernatural more than any other animal" (perhaps with the exception of the snake), being considered "as an intermediary between the living and spiritual worlds" (Kolig 1978; Kolig 1973 - cited in Smith and Litchfield 2009). In some Indigenous mythology, humans are believed to have dingo origins, there being a time when dingoes and humans were one and the same (Rose 1992). The fact that, humans and dingoes were the only large placental mammals in pre-European Australia, with a similar male genital layout compared with marsupials, may go some way towards explaining this belief. Citing McIntosh (1999), Smith and Litchfield (2009) state that the dingo, as a sacred totem, provides a reference point for indigenous Australian customs and social structure, serving as "a powerful symbol for moderation in behavior at both individual and group levels."

This perspective on the universal and Australian Indigenous cultural significance of the dingo highlights the importance of recent attempts by Indigenous Victorian groups to ensure protection of the dingo. As noted above, the Dja Dja Wurrung people of north central Victoria have recently struck a co-management agreement with Victorian authorities for management of some traditional lands, which are included in national parks. The Dja Dja Wurrung people have explicitly identified protection of the dingo ('Gal Gal') on their lands as a priority in the co-management plan:

...the history of logging, mining and settlement has greatly depleted the Parks and wider DDW Country of vital resources to support these animals. DDW People place high value on all native animals, **and the reintroduction of Gal Gal and other culturally important animals within the landscape is identified as an action in their *Dhelkunya Dja Country Plan*. The Gal Gal is also valued as an iconic Australian species by the wider community.**

Native apex predators, such as the Gal Gal, provide an overall benefit to biodiversity and ecosystem function, including through their interactive roles with medium-sized predators, such as foxes and cats. (Dhelkunya Dja Land Management Board 2018)

Other Indigenous groups, including in the northwest of Victoria are developing an enthusiasm for protection of the dingo on their traditional lands. If mutual respect, reconciliation and Indigenous empowerment over the management of their traditional lands are to be genuinely embraced and not to be merely notional, the Victorian government has little choice but to adopt a fundamentally new approach to the protection of the dingo. The inherited colonial mindset towards the dingo and Indigenous Victorians must be superseded.

Section 7 Conclusion and recommendations

This submission has presented evidence and discussion which shows that the current conservation arrangements for the Dingo in Victoria are seriously deficient. It argues that these deficiencies are not only of consequence for the well-being and survival of the dingo as a native taxon, but have far reaching implications for the integrity of Victorian ecosystems, including for the survival prospects of other native species. The submission highlights poor integration between interdepartmental policy and programs, particularly in relation to the apparent inability of the agriculture bureaucracy to genuinely cooperate with apex predator conservation imperatives. Evidence has also been given to highlight the significance of dingo conservation for Indigenous Victorians and that the false distinction between dingoes and ‘wild dogs’ is an affront to Indigenous Victorians. Adequate dingo protection is an important dimension of ensuring respect for First People’s connection to country.

Analysis of official Victorian stock loss numbers in context of the size of the Victorian sheep flock over time clearly shows that there is no credible, substantial case for ongoing, widespread and intensive lethal control dingoes and dingo hybrids. Supplementary arguments concerning opportunity cost to farmers, although constantly reiterated by Victorian agriculture authorities, are farfetched. Such reiterations more resemble rhetorical incantation than a commitment to fact.

Much research now suggests that, although hybridization of the wild dingo populations with domestic dogs is common, the greater part of the dingo hybrid population is of high conservation value. Most dingo hybrids are not readily distinguishable from ancestral ‘pure’ dingoes in either appearance or ecological behavior. The term ‘wild dog’ is misleading and has been used to justify ecologically disruptive and damaging policy and practices.

As it stands, the government management of dingoes and dingo hybrids in Victoria reflects a time when the significance of apex predators for ecosystem health was not well understood or appreciated. The present policy orientation, which arbitrarily distinguishes between dingoes and ‘wild dogs’, is anachronistic and harmful to biodiversity conservation. Although the Victorian Brumby government’s listing of the dingo as threatened was a significant step forward, it did not go far enough and is now an obstacle to necessary policy development. The current policy fixation on the protection of only ‘pure dingoes’ fails to offer protection to ecologically functional dingo hybrids and mischaracterizes many pure dingo hybrids as ‘invasive pests’, and mistakenly assigns many pure dingoes as hybrids. A serious consequence of this flawed approach is the imposition of humans as apex predator in Victorian ecosystems, while actively persecuting Victoria’s native apex predator – the dingo. Perversely, this is being done in the name of ‘invasive pest animal management’.

Contrary to the imperative to conserve predator function within Victorian ecosystems,

in unprotecting the dingo, the current dingo Order in Council facilitates the lethal control of dingoes within an extensive 3 kilometre zone at the interface of public and private land. In this context, AFCAD Inc. makes the following observations and recommendations:

- The negative ecological consequences of this lethal control extend far beyond the 3 km zone, because dingoes can move tens of kilometres from uncontrolled to controlled areas and hence, the buffer zone in small reserves would fail to conserve dingoes, and the many animals and plants that depend on them.
- Non-lethal forms of farm-stock protection have been inadequately incorporated into management *plans as an alternative, not a supplement* to lethal control and remain insufficiently prioritised in government policy.
- The lethal control of dingoes can facilitate increases in the abundance of mesopredators (cats and foxes) and herbivores (kangaroos, wallabies, goats and possibly deer). Kangaroo overpopulation has occurred in many other areas of Australia when dingoes are removed leading to high browse damage to plant communities.
- That dingo unprotection Order in Council permits lethal control to occur in areas of Victoria where farm-stock protection is only a marginal issue.
- The dingo unprotection Order in Council is premised on a scientifically unsound distinction between ‘pure’ dingoes and ecologically functional dingo hybrids.
- The extent and intensity of lethal control are disproportionate to the relatively small scale of the threat to farm stock in Victoria.
- The dingo unprotection Order in Council is inconsistent with appropriate and growing public concern with causing unnecessary harm and death to sentient wild animals, such as dingoes.
- The working relationship between the Victorian agriculture and environment bureaucracies on dingo conservation appears to have broken down. As a result, balanced ‘whole of government’ decision making around the issue of apex predator protection and conservation has failed to materialise.
- There appears to be an unhealthy degree of influence amongst the Victorian agriculture bureaucracy (within the Department of Jobs, Precincts and Regions) from extreme elements from within the farming lobby and pro-lethal control industry-based organisations. Rather than exercise arms-length discretion in relation to such vested interests, the agriculture bureaucracy has uncritically incorporated these vested interests’ extreme lethal control agenda into government policy.

Recommendation 1: Rescind the dingo unprotection Order in Council

Recommendation 2: Discontinue use of the term ‘wild dog’ in government discourse to describe dingoes and dingo hybrids.

Recommendation 3: Recognise ecologically functional Dingo hybrids as wildlife; broaden the definition of the dingo under the current FFG Act dingo threatened species listing to include dingoes that test 75-100% as measured by the Wilton purity test. At the same time, delist dingo hybrids in this purity range as ‘established pests’ under the CALP Act.

Recommendation 4: Recognize high conservation value dingo hybrids as wildlife under the Victorian Wildlife Act 1975 (i.e. that test > 50% <75% on the Wilton test); simultaneously delist such dingo hybrids as 'established pest animals' under the Catchment and Land Protection Act.

Recommendation 5: Redraft Dingo threatened species Action Statement to acknowledge the inclusion of dingo hybrids >75% as part of the listing and as eligible for protection actions.

Recommendation 6: Establish a dingo conservation advisory committee comprised of ecological experts and dingo conservation stakeholders to advise the Victorian government on priority conservation measures for the dingo; (an as yet un-enacted recommendation in the Dingo FFG Act threatened species Action Statement.)

Recommendation 7: Maximise reliance upon non-lethal farm livestock protection measures;

Recommendation 8: Introduce a system of financial compensation to farmers for verified stock loss.

Recommendation 9: Explore options for dingo reintroduction into habitats where it has been extirpated in Victoria, for example in the Murray Sunset National Park.

Recommendation 10: Maximize apex predator range to maximize conservation outcomes and to facilitate apex predator ecosystem benefits; undertake reintroduction of dingoes into suitable habitats where it has been extirpated in Victoria, for example in the Murray Sunset National Park.

Recommendation 11: Prohibit recreational hunting of dingoes and dingo hybrids on Crown Land

Recommendation 12: Limit further hybridization of dingoes and dingo hybrids in the wild through the introgression of domestic dog genes (*Canis familiaris familiaris*); ensure that local governments adjacent to dingo habitat areas require the neutering of domestic dogs (possible exceptions may be considered for important domestic dog breeding stock)

Recommendation 13: Ensure apex predator conservation priorities are not compromised by historically received prejudicial attitudes and ministerial conflicts of interest;
Responsibility for apex predator management and protection fall solely within the remit of the Minister for the Environment;
Undertake public educational initiatives to increase awareness about the cultural and environmental value of dingo/dingo hybrid populations in Victoria.

Recommendation 14: Conduct an audit of online and other government departmental policy literature and statements to ensure that misinformation about the ecological function of dingo/dingo hybrids is removed.

Recommendation 15: Conduct a public inquiry into the now excessive industry-based influence within the Victorian agriculture bureaucracy.

References

Australian Labor Party (ALP) Victorian Branch, (2018) Platform

Australian Labor Party (ALP) Victorian Branch, (2014) Platform

Border Mail, 'Restrictions lifted on trapping dogs', Sept. 8, 2014

Kylie M. Cairns, Bradley J. Nesbitt, Shawn W. Lafan, Mike Letnic, Mathew S. Crowther. (2019) 'Geographic hot spots of dingo genetic ancestry in southeastern Australia despite hybridisation with domestic dogs', *Conservation Genetics*, https://ban1080.org.au/wp-content/uploads/2020/02/Cairns2019_Article_GeographicHotSpotsOfDingoGenet.pdf

Cairns, K. (2016) Private communication to Victorian Environment Minister, May 3, 2016

Daniels M. and Corbett, L. (2003) 'Redefining introgressed protected animals: when is a wildcat a wild cat and a dingo a wild dog?', *Wildlife Research*, 30, 213-218

Department of Environment, Water, Land and Planning (DEWLP) (2019) Wild Dog Aerial Baiting Report, October

Department of Sustainability and Environment (2012) Action Statement *Canis Lupus* ssgsp. *Dingo*

Jones, E. (1990) 'Physical characteristics and taxonomic status of wild canids, *Canis familiaris*, from the highlands of eastern Victoria', *Aust. Wild. Res.*, 17, 69-81

Jones, E. (2009) 'Hybridisation between the dingo, *Canis lupus dingo*, and the domestic dog, *Canis lupus familiaris*, in Victoria: a critical review', *Australian Mammalogy*, CSIRO Publishing, 31, 1-7

Gould, R. A. 1970. Journey to Pulykara. *Natural History* 79: 56-66.

Government of Victoria, (2017) *Protecting Victoria's Environment: Biodiversity 2037*, https://www.environment.vic.gov.au/data/assets/pdf_file/0022/51259/Protecting-Victorias-Environment-Biodiversity-2037.pdf

Government of Victoria, (2017) *Protecting Victoria's Environment: Biodiversity 2037*, Flagship 4 statement, <https://www.environment.vic.gov.au/biodiversity/biodiversity-plan-2037/biodiversity-2037-flagships/biodiversity-2037-flagship-4>

Hamilton, A. (1972) 'Aboriginal Man's Best Friend?', *Mankind*, 8, 287-295

Johnson C. (2006) *Australia's Mammal Extinctions – a 50,000 year history*, Cambridge University Press, Melbourne

Kolig, E. 1973. Aboriginal man's best foe. *Mankind* 9: 122-124.

Kolig, E. 1978. Aboriginal dogmatics: canines in theory, myth and dogma. *Bijdragen tot de Taal-, Land- en Volkenkunde* 134: 84-115.

Letnic, M., Koch, F., Gordon, M., Crowther, S. and Dickman, C. (2009) 'Keystone effects of an alien top-predator stem extinctions of native mammals', *Proc. R. Soc. B* 2009 276, 3249-3256 first published online 17 June 2009, doi: 10.1098/rspb.2009.0574

Mattias C. R. Oskarsson, Cornelya F. C. Klütsch, Ukadej Boonyaparakob, Alan Wilton, Yuichi Tanabe, and Peter Savolainen, (2011) 'Mitochondrial DNA data indicate an introduction through Mainland Southeast Asia for Australian dingoes and Polynesian domestic dogs', *Proceedings of the Royal society B- Biological Sciences*, published online 7 September 2011 doi: 10.1098/rspb.2011.1395

Meek, P.M. and Shields, J (2001) Positive Dingo Management: how not to throw out the baby with the bath water, pp 65-74 in Dickman C.R. and Lunney D. ed. (2001), *A Symposium on the Dingo*, Royal Zoological Society of New South Wales, Southwood Press, Marrickville NSW.

Nationals (2010) Coalition to use aerial baiting to protect livestock, fauna from wild dogs. Media Release, September 22.

NSW Department of Primary Industries, (2015) Webinar , Dr Gordon Refshauge

Robley, A., D. Ramsey and Woodford L. (2018) 'Estimating population changes in wild dogs, feral cats and foxes in relation to an aerial baiting operation in eastern Victoria', Arthur Rylah Institute for Environmental Research, Technical Report Series, no. 292

Stephens, D. PhD (2011) Thesis, 'The Molecular ecology of Australian wild dogs: hybridisation, gene flow and genetic structure at multiple scales, University of Western Australia, August 2011

Victorian Scientific Advisory Committee (VSAC) (2007) Final Recommendation on Nomination for The Listing – Dingo, File number FF/54/0643

Wilton, Alan, Private communication to Dr Ian Gunn, July 14, 2011, 11:34 RE: Dingo purity testing using DNA