

*Letter to the Editor*

A response to Benjamin L. ALLEN et al. 2011 [Current Zoology, 57 (5): 568–583]

## Demonising the dingo: How much wild dogma is enough?

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**Abstract** The roles that top predators play in regulating the structure and function of ecosystems have long been controversial. This is particularly the case when predators pose adverse risks for human life and/or economic interests. The critique of literature on dingoes and their ecological roles in Australia provided by Allen et al. (2011) shows that top predators remain a potentially polarising issue. In opposition to Allen et al. we argue that these widespread patterns of species' abundances, attributed to the effects of dingoes and evident at scales ranging from the foraging behaviour of individuals through to continental scale patterns of species abundances, constitute strong support for the mesopredator release hypothesis and provide evidence that dingoes benefit biodiversity conservation by inducing community wide trophic cascades. Harnessing the positive ecological effects of dingoes while at the same time minimising their impacts on agriculture is a major socio-political challenge in Australia [Current Zoology 57 (5): 668–670].

**Keywords** Trophic cascade, Mesopredator release hypothesis, Dingo, fox, Intra-guild predation

The roles that top predators play in regulating the structure and function of ecosystems have long been controversial. This is particularly the case when predators pose adverse risks for human life and/or economic interests. The critique of literature on dingoes and their ecological roles in Australia provided by Allen et al. (2011) shows that top predators remain a potentially polarising topic. As some of the authors criticised by Allen et al. (2011), we welcome the opportunity for debate and for more thorough examination of the ecological role(s) of dingoes in Australia. Indeed, there has been deep resistance in some circles within the Australian scientific community (Coman and Evans, 2007; Dawson, 1995, Newsome et al., 2001) to the idea that dingoes may have a regulatory role in Australian ecosystems ever since Caughley et al. (1980) attributed differences in kangaroo and emu numbers on either side of Australia's dingo fence to the effects of dingoes. The argument usually put forward in opposition to the hypothesis that dingoes regulate kangaroo numbers has been that studies comparing the abundance of species in

areas where dingoes are present and absent have been confounded owing to the spatial segregation of treatments (Dawson, 1995; Newsome et al., 2001). However, studies conducted throughout the continent now indicate that disparities in kangaroo and emu numbers in areas with and without dingoes remain consistent regardless of whether land is used for the purposes of sheep or cattle grazing or conservation reserve (Caughley and Grigg, 1982; Grice et al., 1985, Letnic et al., 2009b; Pople et al., 2000). Indeed, the differences are so consistent across times, habitats and land systems that it requires special pleading – and rejection of Ockham's razor – to suggest that local circumstances always conspire to produce the same observed patterns in the abundance of kangaroos and emus.

In recent years debate on the ecological role of dingoes has moved on to examine the effects that dingoes have on smaller predators and, indirectly, on the prey of mesopredators. In accord with the mesopredator release hypothesis (Soulé et al., 1988) and a large body of evidence from other continents (Ritchie and Johnson,

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2009), several Australian studies have attributed an inverse relationship between the abundances of dingoes and invasive red foxes to the predatory and competitive effects of dingoes on foxes (Johnson and VanDerWal, 2009; Letnic et al., 2009a; Letnic et al., 2009b; Letnic et al., 2011; Newsome, 1990; Newsome et al., 2001; Wallach et al., 2010). A number of field and desktop studies conducted at spatial scales ranging from comparisons of paired sites of several hundred hectares each to continental patterns of abundance have also found prey species known to be vulnerable to predation by foxes such as rabbits, rodents and small and medium sized marsupials, to be more common in the presence than in the absence of dingoes (Dickman et al., 2009; Glen and Dickman, 2005; Johnson et al., 2007; Letnic et al., 2009a; Letnic et al., 2009b; Letnic and Koch, 2010; Newsome et al., 2001; Read, 1997; Smith and Quin, 1996; Thompson, 1983; Wallach et al., 2009; Wallach and O'Neill, 2009; Wallach et al., 2010). The authors of these studies have suggested a likely mechanism by which these benefits for prey accrue is that by interacting with foxes, dingoes reduce the predatory impact of foxes on their prey. Although these studies have been based on natural experiments made possible by differences in land management or the presence of natural geographic barriers rather than 'manipulative' experiments, the patterns in species abundance have been replicated throughout the southern half of the continent where foxes occur and are consistent with predictions made under the mesopredator release hypothesis and theory of intra-guild predation regarding what might happen when a top-predator is removed from an ecosystem (Ritchie and Johnson, 2009; Soulé et al., 1988; Vance-Chalcraft et al., 2007). The notion that dingoes provide prey with refuge from predation by foxes is given mechanistic support by findings that the consumptive and non-consumptive impacts of foxes on an endangered rodent, the dusky hopping mice, are alleviated in presence of dingoes (Letnic and Dworjanyn, 2011). In this case, both the abundance of foxes and frequency of hopping mouse remains in predator scats were lower in the presence of dingoes; correspondingly, hopping mice were more abundant and foraged less apprehensively in the presence of dingoes.

In opposition to Allen et al. (2011) we argue that these widespread patterns of species' abundances, attributed to the effects of dingoes and evident at scales ranging from the foraging behaviour of individuals through to continental scale patterns of species abundances, constitute strong support for the mesopredator

hypothesis and provide evidence that dingoes induce a community wide trophic cascade. We contend that on close examination, Allen et al.'s (2011) paper is not a review but is instead a study by study critique. By focussing on specific details of different published articles their work misses the meta-patterns that have been uncovered in previous literature. Hence, their work does not provide an argument against the mesopredator release hypothesis in Australia, but instead advocates a narrow approach that does not properly consider the implications of ecological theory or the relevance of similar studies conducted overseas. We challenge Allen et al. (2011) to demonstrate why the ecological inter-relationships of a top-predator, mesopredator and their prey in Australia should be so fundamentally different to anywhere else.

The critique of Allen et al. (2011) also pays scant attention to the sampling procedures of the studies they criticise and the statistical techniques that are used to analyse the data. In many cases, the 'confounding' they refer to is not elaborated on, but is used in combination with provocative language to stigmatise the studies that they consider to be wrong. Allen et al. (2011) appear to confuse variability with confounding. There is intrinsic variability within all the datasets they critique owing to variation in habitat, climate and sampling error (as in most broad-scale ecological studies), hence the reason for the replication of sites within each of the studies. While such variability inevitably created noise in the datasets, it did not mask consistent differences in ecosystem properties between sites where dingoes were abundant and rare (Letnic et al., 2009a; Letnic et al., 2009b; Wallach et al., 2010). Additionally, the statistical techniques employed, such as meta-analysis, generalised linear modelling, mixed modelling, quantification of spatial autocorrelation and model-averaging, accounted for other potential forms of variation in the analyses. We believe that the approach employed by Allen et al. (2011) is not conducive to advancing ecological debate or indeed for properly considering the ecological impacts of dingoes. There is no doubt that sampling strategies for many of the reviewed studies (and indeed all studies) could be improved upon, but this does not mean they are wrong, confounded or invalid. This is particularly pertinent as the studies they criticise are published in highly reputable journals and have therefore gone through a rigorous peer review process.

There is no doubt that dingoes can and do kill livestock and thus have adverse economic and social im-

pacts at certain times and places. However, this is an entirely different situation from that emphasised in the studies criticised by Allen et al. (2011) that highlight the positive impacts that dingoes may have on ecosystems by attenuating the impacts of herbivores and mesopredators. Given the evidence presented in the large body of work criticised by Allen et al. (2011), we feel that it is short-sighted to conflate the positive ecosystem and negative production effects of dingoes. We therefore encourage Allen et al. (2011) to provide an objective assessment of the net worth of maintaining species, such as the dingo, within the landscape. We believe that harnessing the positive ecological effects of dingoes while at the same time minimising their impacts on agriculture is a major socio-political challenge in Australia, as it is for wolves in North America and Europe. The big challenge will be finding a place where wild dogs can be dingoes.

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