

Responses to questions taken on notice:

Inquiry into Ecosystem Decline in Victoria

This submission seeks to provide input into the following specific items listed in the Terms of Reference:

- a) the extent of the decline of Victoria's biodiversity and the likely impact on people, particularly First Peoples, and ecosystems, if more is not done to address this, including consideration of climate change impacts;
- b) the adequacy of the legislative framework protecting Victoria's environment, including grasslands, forests and the marine and coastal environment, and native species;
- c) the adequacy and effectiveness of government programs and funding protecting and restoring Victoria's ecosystems;
- d) legislative, policy, program, governance and funding solutions to facilitate ecosystem and species protection, restoration and recovery in Victoria, in the context of climate change impacts
- f) any other related matters

Prepared by

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The Research Centre for Future Landscapes is a multi-disciplinary environmental research centre based in the School of Life Sciences, College of Science, Health and Engineering at La Trobe University, Australia. The Centre is primarily concerned with the nature of landscape change, its drivers, and management interventions necessary to sustain species, communities, ecosystems and society.

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At the hearing on April 21, the following matter(s) were taken on notice:

1. ‘...are you aware of any other jurisdictions that have that type of approach where you have got an independent oversight like an Auditor-General or somebody else? Do you know if Canada or New Zealand or any of those other jurisdictions,’ as noted on page 63 of the transcript;
2. ‘So how much of a threat is land clearing, say for instance, for animal agriculture to biodiversity, and should we be looking more closely at regenerative agriculture and plant-based agriculture as a result?’ As noted on page 64 of the transcript;
3. ‘Would a trial be good, in your opinion, of returning the apex predator, the dingo, to a particular area, to talk about introduced species and control of those introduced species?’ As noted on page 64 of the transcript.

We address each of these issues below.

1. Independent Auditor of Environmental Performance

Victoria currently has a Commissioner for Sustainability, whose role is to provide “independent and objective scientific reporting to inform policy-makers, scientists and the wider Victorian public on the state’s natural environment” (<https://www.ces.vic.gov.au/about-us/what-we-do>). The Commissioner’s function is restricted to *reporting* on the condition of Victoria’s environment through the ‘State of Environment’ reports and to “encourage” decision-making that facilitates ecologically sustainable development and sound environmental practices, and “enhance knowledge and understanding” of sustainability issues. In 2017, the powers of the Commissioner were extended to “conduct annual strategic audits of, and prepare reports on, the implementation of environmental management systems by Agencies and public authorities” (<https://www.ces.vic.gov.au/about-us/what-we-do>). These reports are public reviews but not performance audits. They contain advice and recommendations but do not compel the Government of the day to act.

The Victorian Auditor-General’s Office (VAGO) is an independent office of the Victorian Parliament that conducts an annual program of financial and performance audits of state and local government public sector entities. The performance audits provide independent assurance that public sector agencies or programs are achieving their objectives effectively, economically, efficiently and/or in compliance with all relevant legislation. As with the Australian National Audit Office (ANAO), VAGO conducts performance reports across all sectors of government, covering all public sector entities. There is no legislative requirement for government agencies to accept or implement VAGO recommendations, or publicly report on actions they have taken. However, the vast majority of recommendations are accepted by government, and most are eventually implemented (VAGO, 2020).

While noting favourably that VAGO is currently undertaking a performance audit on ‘Protected Victoria’s Biodiversity’ that will assess how responsible agencies are implementing *Biodiversity 2037* and how well its targets are being achieved, we recommend that either an independent auditor or a specific branch within VAGO is dedicated to environmental and sustainability audits. In effect, this would merge the responsibilities of

the Commissioner for Sustainability - who has a specific remit for the environment and sustainability - with those of VAGO to undertake performance audits, ideally with strengthened powers to implement recommendations.

Similar models exist in other jurisdictions (Rose 2001). Canada has a Commissioner of the Environment and Sustainable Development within the Office of the Auditor General of Canada (<https://www.oag-bvg.gc.ca>). On behalf of the Auditor General, the Commissioner conducts performance audits, and is responsible for:

- monitoring sustainable development strategies of federal departments;
- overseeing the environmental petitions process; and
- auditing the federal government's management of environmental and sustainable development issues.

In New Zealand, the Parliamentary Commissioner for the Environment is an independent Officer of Parliament who has broad powers to investigate environmental concerns and is wholly independent of the government of the day (<https://www.pce.parliament.nz>). The Commissioner reports to Parliament through the Speaker of the House and the Officers of Parliament Committee. The Commissioner's functions include (among others): review of agencies and processes set up by the Government to manage the country's resources, and report to the House of Representatives; investigate the effectiveness of environmental planning and management by public authorities, and advise them on remedial action; investigate any matter where the environment may be or has been adversely affected, and advise on preventative measures or remedial action; and report and inquire on matters which may have a significant effect on the environment. While the Commissioner can make recommendations to Government, they cannot require their implementation.

2. Should we be looking more closely at regenerative agriculture and plant-based agriculture to mitigate land clearing?

Globally, shifting demand away from ruminant meat (beef, sheep and goat) to plant-based proteins is regarded as an important strategy for reducing land requirements (i.e., land clearing) and greenhouse gas emissions (WRI, 2019). At current rates of productivity and dietary preferences, feeding the global population up to 2050 would require clearing most of the world's remaining forests and releasing enough greenhouse gases to 2°C warming, even if emissions from all other human activities were entirely eliminated (WRI, 2019). Clearly, shifting demand in dietary preferences, coupled with increased production efficiency (i.e., increasing yields per ha and per kg of fertiliser), are important to reduce pressure to clear more land for agriculture.

In Australia, rates of primary clearing (first clearing of native vegetation) have declined but rates of re-clearing (of secondary or tertiary re-growth) have remained relatively steady over the last 30 years (Fig. 1). Nonetheless, Australia has one of the highest rates of land clearing in the world among developed countries. The majority of Australia's contemporary land clearing is in northern Australia (particularly Queensland) (Fig. 2). In Victoria, a total of 192,700 hectares were cleared between 2010-2019, with 17,000 of that classified as primary conversion (Fig. 3).

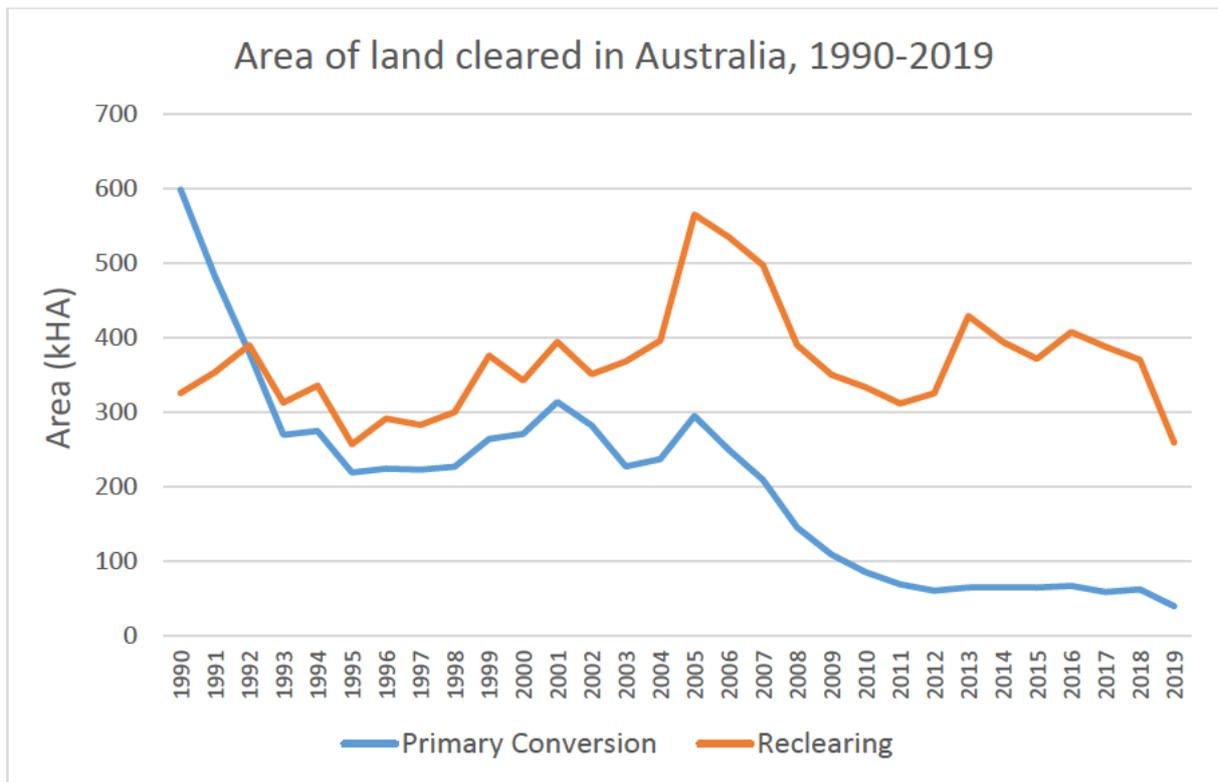


Figure 1. Rates of land clearing in Australia, 1990-2019.

Source: Australian Government (Department of Industry, Science, Energy and Resources) Land Use, Land Use Change and Forestry dataset.

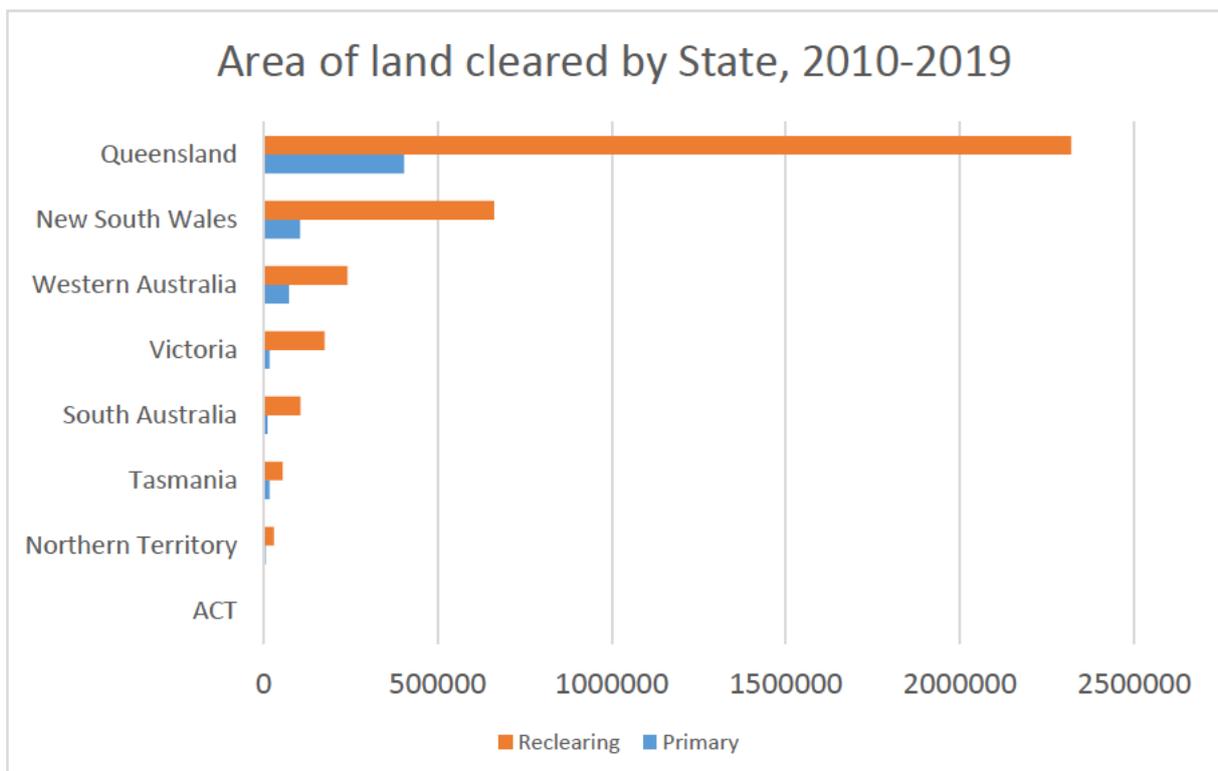


Figure 2. Rates of land clearing by State in Australia from 2010 to 2019.

Source: Australian Government (Department of Industry, Science, Energy and Resources) Land Use, Land Use Change and Forestry dataset.

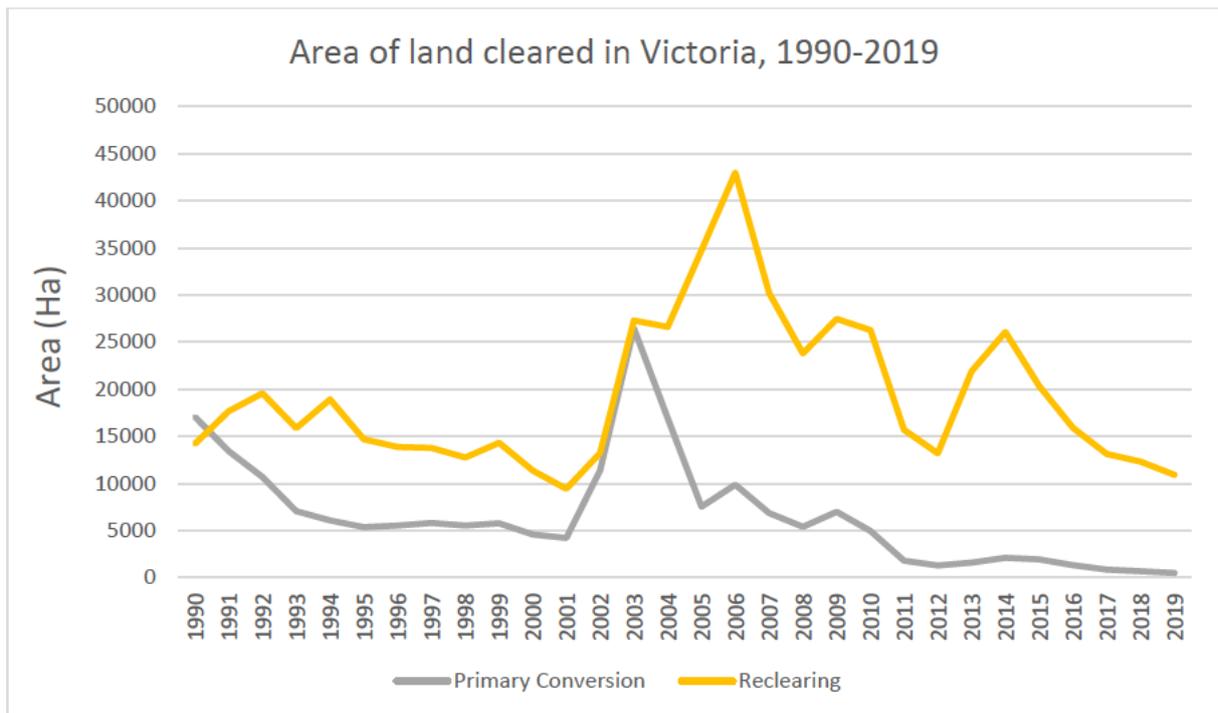


Figure 3. Rates of land clearing in Victoria from 1990 to 2019.

Source: Australian Government (Department of Industry, Science, Energy and Resources) Land Use, Land Use Change and Forestry dataset.

Land clearing is primarily for agriculture, with clearing associated with “grazing native vegetation” accounting for 203,100 ha of primary clearing and 1.35 million hectares of re-clearing from 2015-2019 (<https://ageis.climatechange.gov.au/QueryAppendixTable.aspx>). This accounted for about three-quarters of all land clearing in Australia from 2015-2019. In contrast, clearing for cropping and horticulture over this timeframe resulted in 4,600 ha of primary clearing and 72,300 hectares of re-clearing, which represents about 1.5% and 4%, respectively, of total clearing between 2015-2019. Thus, it is clear that the areal extent or footprint of livestock grazing is much larger than cropping and horticulture, and has been responsible for more land clearing in Australia over the last 5-10 years.

It should be noted however, that this analysis does not take inputs and intensity of use into account. Land used for cropping and horticulture has minimal biodiversity value, while grazing land can often retain significant species and biodiversity value, depending on grazing management and intensity of clearing.

Regenerative Agriculture

The case for regenerative agriculture providing benefits for biodiversity at landscape scales remains ambiguous. There has been too little research that directly addresses the impact of regenerative agricultural practices on biodiversity, either within production areas or in the broader landscape, especially within Australia (Tuck et al. 2014; Al-Habsi et al. 2017). Given the growing body of evidence (mostly from Europe) about the ecosystem-wide impacts of insecticides (Hallman et al. 2014; Chagnon et al. 2015; Pisa et al. 2015), any reduction in the use, or replacement, of broad-scale insecticide associated with regenerative agriculture is

likely to have wide biodiversity benefits, from pollinating insects and predatory arthropods, to insectivorous birds, bats and reptiles.

Organic farming practices have been widely reported to provide for greater richness and abundance of biota (Bengtsson et al. 2005; Winqvist et al. 2011; Tuck et al. 2014; Lichtenberg et al. 2017; Stein-Bachinger et al. 2019; Katayama et al. 2019a) though some ambiguity around the effects of organic versus conventional systems on biodiversity remain (Bengtsson et al. 2005; Winqvist et al. 2011), especially in relation to landscape context (Galloway 2021). Organic farms have been shown to support more predatory arthropods than conventional farms in landscapes with little natural vegetation, however, where natural vegetation covers more of the landscape (on the scale of kilometres) this difference becomes less pronounced (Galloway 2021). The importance of heterogeneity at the farm and landscape scale has consistently being recognised by multiple authors (see Winqvist et al. 2011; Tuck et al. 2014; Lichtenberg et al. 2017; Paiola et al. 2020; and Galloway et al. 2021), regardless of farming method (Lichtenberg et al. 2017; Katayama et al. 2019a; Katayama et al. 2019b; Galloway et al. 2021).

In a meta-analysis of 96 studies comparing organic with conventional agricultural practises, Stein-Bachinger et al. (2019) assessed the effects of such management on several select groups of biota. On organic farms, species richness was, on average, 35% greater for birds, 22% greater for insects, and 15% greater for spiders, while plant species richness was 95% greater than on conventional farms. While organic farming tends to be at the extreme end of regenerative agriculture, when researchers have considered a gradient of low-input agricultural practises, benefits to biodiversity have generally been found in all low-input systems compared with conventional practise (Lichtenberg et al. 2017; Katayama et al. 2019b).

Regenerative practices have shown generally positive impacts on microbial communities, though effects following transition of management to low-impact agriculture may be somewhat delayed compared with other measures of soil health (Krishnakumar et al. 2005; Santos et al. 2012; Riedo et al. 2021). Lori et al. (2017) conducted a meta-analysis on 56 microbial studies originating from different climatic zones and varying in experimental duration (ranging from 3 to more than 100 years). Strong positive effects on microbial communities were identified in organic systems, with 32% to 84% greater microbial biomass carbon, microbial biomass nitrogen, total phospholipid fatty-acids, and dehydrogenase, urease and protease activities than in conventional systems.

While many studies have found arbuscular mycorrhizal fungi are more likely to benefit from low-input agriculture (Gosling et al. 2006), many primary studies (e.g. Ryan et al. 1994; Penfold et al. 1995; Dann et al. 1996) have found poor performance in relation to crop yield in organic systems. However, common land management practises, including regular tillage, use of copper-based fungicides and phosphorus application, are known to be deleterious to the arbuscular mycorrhizal community (Gosling et al. 2006), and their historical use in many landscapes may cause a time-lag in recovery of microbial communities and function (Saffigna et al. 1989; Joergensen et al. 2010; Santos et al. 2012).

It should be noted that the majority of studies cited above are from the Northern hemisphere and evidence for regenerative agriculture providing benefits for biodiversity in Australia and at **the landscape scale** remains sparse. In many cases, regenerative agriculture

revolves around low-input farming, and often results in lower yields (but equal or higher profits), and the case could be made that more land is required to produce similar total quantities of produce. Under these circumstances, the net benefit of regenerative practices for biodiversity may be cancelled out by more land being under production. This remains an active area of research.

3. Would you support a trial re-introduction of the Dingo to control introduced predators?

We support a trial of the re-introduction of the Dingo to test the benefits for conservation of native wildlife, but not in Victoria. Newsome et al (2015) set out a proposal for a trial re-introduction in Sturt National Park in NSW, an extensive and remote area, based on realigning the Dingo fence to allow recolonisation of a large section of the park where it has not been present. This would allow a 'before-after-control-impact type of scientific study, and test the potential impact of the Dingo on introduced predators (Red Fox, Cat) and a range of herbivores (macropods, feral goats, European Rabbit), and flow-on effects to other species in the ecosystem. Note that this trial has been proposed because there is contention concerning the strength of evidence on the role of the Dingo in controlling meso-predators such as the Red Fox and Cat.

Why not in Victoria?

The Dingo currently occurs in Victoria in several areas of extensive native vegetation, including parts of the Mallee region (Big Desert) and eastern Victoria (Alpine region and East Gippsland). There is a case for a more tolerant attitude to the Dingo in these large, remote areas. However, returning the Dingo to other parts of Victoria (for a trial or permanently) is problematic for several reasons.

a) in most other regions of Victoria, remaining areas of native vegetation occur as remnant blocks (large and small), typically surrounded by farmland. In many such areas (e.g. Grampians, Box-Ironbark forests of north-central Victoria, remnant blocks of south-western Victoria), adjacent farmland is used for sheep/wool production. Dingoes and sheep farming essentially are incompatible.

b) Re-introducing Dingoes to such areas would immediately set up conflict with sheep farming, as Dingoes will move across forest edges into farmland, and stock losses would undoubtedly occur on a regular basis.

c) Consequently, an attempt to trial the reintroduction of Dingoes to an area such as the Grampians in Victoria is likely to be counterproductive for nature conservation. There would be a number of negative aspects, such as financial compensation required for stock losses on private land, but more importantly the adverse publicity and hostility would affect community attitudes to the National Park and social support for nature conservation more broadly. The potential benefits are not known, but likely to be modest.

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