Inquiry into Australia's Extinction Crisis

Response from Invertebrates Australia

Invertebrates Australia is an environmental charity whose mission is to conduct, promote and support the science and conservation of Australian invertebrates, that is, our insects, spiders, crustaceans, worms, snails, jellyfish, urchins, and corals (animals without backbones).

Invertebrates Australia was founded by a group of scientists in September 2021, motivated by the alarming results of their government report on the impact of the 2019/2020 megafires on Australia's invertebrates, global indicators of biodiversity decline, and the clear need for invertebrates to be valued properly, both in ecological and economic terms, to secure Australia's ecosystems and the services they provide.

In this submission we have addressed the Terms of Reference a, b, c, d, h, j.

The ongoing decline in the population and conservation status of Australia's nearly threatened fauna and flora species

Australia ranks amongst the countries with the highest rates of biodiversity decline (Waldron *et al.* 2017). Invertebrate animals are the majority of Australia's biodiversity, performing many ecosystem services, the economic worth of which is estimated at many billions of dollars annually. With estimates of 320,000 invertebrate species found on the continent (Chapman, 1999), only 110,000 of which are formally described, there is a notable mismatch between the resourcing currently allocated to invertebrate conservation in Australia and the number of species. Invertebrates represent 95% of faunal diversity in Australia but they constitute only 15% of species assessed under the EPBC Act (DCCEEW website; accessed 28/8/2022). Chronic neglect, in terms of resource allocation for basic research and conservation planning, policy, and response, combined with the vast number of species, means it is currently not possible to measure the population trajectory or conservation status, or take the required conservation actions, for most invertebrate species. This is problematic because they are threatened by the same process that threatens all biodiversity: climate change, pollutants and pesticides, and habitat destruction among others.

The synergistic effects of threatening processes such as climate change (including fire, drought, flood), habitat loss and fragmentation, changes to waterways, and pesticide use have almost certainly already caused population declines and extinctions for many Australian invertebrate species. It is likely that many invertebrate species are threatened or near-threatened, but are not recognised as such. For example, many invertebrate taxa have traits associated with elevated risk of extinction, such as restricted distributions, habitat specificity, host specificity, poor dispersal capacity, and low tolerances to fluctuations in temperature or humidity. Given the immense importance of many invertebrate species to functioning of healthy ecosystems, there is clear potential for these 'quiet extinctions' to have ongoing ramifications for other taxonomic groups, and for the biosphere more broadly.

The 2019-2020 Australian wildfires, which impacted large areas of habitat and the invertebrates therein provides an useful case study. 14,000 of our described invertebrate species had some proportion of their known range impacted by fire, and 382 species had 100% of their known range burnt (Marsh et al., 2022). Because only one third of Australian invertebrates are named, this figure is a gross underestimate (Chapman, 1999). The extreme extent and severity of the 2019-2020 fires, likely caused the decline of many species with at least one species, a plant louse (*Pseudococcus markharveyi*) now believed extinct as a directly result of the fires because the complete stand of it's obligate host plant was burnt

(Moir, 2021). Other species have been pushed closer to extinction; the Kangaroo Island Assassin Spider (*Zephyracrhaea austini*), occupies a microhabitat that is a feature of long unburnt ecosystems, and which takes substantial time to re-establish post-fire; its known range was impacted by the fires (Marsh & Glatz, 2022) and it is now listed as Critically Endangered under the EPBC Act.

The wider ecological impact of faunal and flora extinction

The consequences of the loss of invertebrates cannot be overstated. Invertebrate extinctions will impact pollination, decomposition and nutrient cycling, water filtration, the structure of food webs, and cultural services to humans more broadly. Biodiversity at all invertebrate trophic levels, from herbivores to detritivores to predators, is necessary to secure ecosystems (Soliveres *et al.* 2016). Invertebrates such as insects are crucial pollinators of the majority of the world's crops irreplaceable in food security for humans. Without the invertebrates, key processes such as the cycling of nutrients in soil and aquatic substrates, and the decomposition of organic matter therein, would also not be possible. For example, marine invertebrates such as limpets and snails contribute to decomposition by consuming, for example, bacterial mats associated with whale falls (Smith and Bacco 2003). Other marine invertebrates such as oysters and corals also build reefs that protect coasts from erosion and reduce water pollution (Ysebaert *et al*. 2019; Harris *et al.* 2018). Invertebrates fill multiple trophic levels in food webs, making vital nutrients available to other organisms including vertebrates. Their role as a food source to vertebrates contributes to human health by supporting 'recreation' services, such as maintaining bird diversity: this not only promotes biodiversity in respective habitats, but also has the beneficial by-product of providing cultural benefits for humans (Soliveres *et al.* 2016).

Recommendations

We recommend gathering available data to estimate extinction risk and prioritise species for assessment. Strategic prioritising of the study and protection of species that have traits which are likely associated with elevated extinction risk, e.g. species with extremely small distributional ranges, susceptibility to increased stochasticity of climate change, etc. Deeper knowledge of such invertebrates will require the expertise of ecologists, taxonomists, molecular biologists and conservation scientists, making increased resourcing and funding critical to mitigate drivers of invertebrate extinctions.

The international and domestic obligations of the Commonwealth Government in conserving threatened species

The extinction rate for mammals in Australia is exceptionally high (Woinarski et al. 2015) and it is likely that invertebrate extinctions are occurring at a similar rate. The vast majority of Australian invertebrates are found only in Australia and as such it is our obligation to maintain our biodiversity to stabilise our ecosystems for our own well-being and that of the rest of the biosphere. We must adhere to our responsibilities under UNESCO agreements and equivalents. We cannot claim to be protecting our biodiversity while the invertebrates remain largely ignored.

The adequacy of Commonwealth environment laws, including but not limited to the Environment Protection and Biodiversity Conservation Act 1999, in providing sufficient protections for threatened species and against key threatening processes

The method of assessing species for protection under the EPBC Act requires individual named species assessments, making it prohibitively slow for the 100,000 named invertebrates and impossible for the 200,000 unnamed species. However, there is an urgent need to increase the number of assessments of invertebrate species. The heightened vulnerability of many invertebrates species to extinction due to ecological and life history traits, it is likely that species are becoming extinct before they are described.

We need a mechanism by which to record species that are assessed and found to be near threatened and those that are found to be data deficient in some aspect that prohibits the completion of their assessment. The EPBC Act as currently stands does not recognise the IUCN categories of Data Deficient or Near Threatened, so assessments of such species are not formally recorded.

We need to boost the Threatened Ecological Communities approach to protecting species. TECs have the potential to provide much-needed protection for invertebrates. An example of an invertebrate-focused TEC is the "Mount Kaputar high elevation and dry rainforest land snail and slug community in the Nandewar and Brigalow Belt South Bioregions" gazetted as an Endangered Ecological Community by the NSW Office of Environment and Heritage. However, this TEC is yet to be listed under the Commonwealth EPBC Act. Another example of an invertebrate-focused TEC is the preparation of national Action Plans assessing the conservation status of higher taxonomic groups. If an Action Plan is in place for a particular taxonomic group, species within this group that are deemed to be of conservation concern may be fast-tracked for listing.

Recommendations

We recommend ecosystem-level protection through the designation of Threatened Ecological Communities as a stop-gap measure in lieu of the inadequate information for specific invertebrate species. We recommend harmonisation of the TEC nomination process between the state and commonwealth agencies to ensure the listing of TECs are consistent across all levels of government, which will improve conservation management and implementation. We also recommend the preparation of Action Plans for taxonomic groups that are of particular conservation priority.

In the longer term, we also recommend detailed conservation assessments for species deemed most at risk of threatening processes highlighted in the TEC assessments as well as additional ones identified therein. These assessments will complement the existing TEC management plans to provide maximum conservation outcomes for both the ecological community as well as the species.

The adequacy of existing funding streams for implementing threatened species recovery plans and preventing threatened fauna loss in general

Funding to implement recovery plans for threatened invertebrates, to prevent the loss of invertebrate species, and to monitor threatened invertebrate species has suffered a chronic shortfall, such that none of the aforementioned measures can be considered adequate for invertebrates in Australia. Given that many of the threatening processes that impact vertebrate fauna in Australia also impact invertebrates, and that many invertebrate species have traits which make them especially susceptible to threatening processes, or less able to adapt to a changing landscape, this shortfall in funding is not the result of a lesser conservation need.

Following the 2019-2020 bushfires, $12 million AUD was spent on the recovery of fire-affected koala (*Phascolarctos cinereus*) populations, which had 17% of its total distribution overlapped by fire (Legge *et al.,* 2021). Whilst providing conservation benefit for

the koala, this amount exceeds the total sum of resources put towards recovery of all fire-impacted invertebrate species, many of which had a far greater distributional fire overlap than the koala (Marsh, *et al.,* 2022). This mismatch between allocated resources, number of species, and conservation needs is likely to have serious implications for the conservation status and population trajectories of many invertebrate species.

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Recommendations

Funding for threatened species recovery plans should better reflect the true diversity and functional significance of species and ecological communities. Funding streams to prevent threatened fauna loss should also include support for documentation of the large number of undescribed invertebrate species in Australia so that species in need of recovery plans can be identified and formally described.

The adequacy of existing assessment processes for identifying threatened species conservation status

As it currently stands, the species listed as threatened under the EPBC Act are heavily biased towards vertebrates, with invertebrates making up only 15% of assessed faunal species. The Samuel Review states that the decline of invertebrates is ongoing (Samuel 2021). However, the review only does so in passing, and when invertebrates are revisited it is in the context of live imports and exports as opposed to in the context of biodiversity loss. As in the IUCN Red List, the EPBC Act recognises categories with which to rank species according to their risk of extinction. In order to prevent extinction we need to be able to meaningfully record which species are missing data, and which data they need, to allow their assessments. As above, in its current form the EPBC Act does not record assessments of such species as it does not have a Data Deficient category. Moreover, a criterion in the IUCN Red List assessment that is of particular relevance to invertebrates is *Vulnerable D2: restricted area of occupancy*, which applies to short-range endemics, is not available when assessing for inclusion under the EPBC Act. This deficiency was flagged by a prominent entomologist five years ago (Braby, 2018) and should be adopted. Finally, a 'coextinction' criterion, would be useful for invertebrate conservation to acknowledge the extinction risk of species dependent on specific hosts or prey (Cardoso *et al.* 2011).

Recommendations

We recommend reform of the EPBC Act to better accommodate and protect invertebrate species. Specifically, we recommend the addition of Near Threatened and Data Deficient categories, to draw attention to at-risk species that cannot be assessed due to lack of data. We also propose the addition of criterion D2, to provide better protection for susceptible short-range endemics and a co-extinction criterion

An Action Plan to systematically inventory ecological communities across Australia should be implemented with special emphasis on the inclusion of invertebrate species through collaboration with invertebrate scientists so that critical invertebrate TECs can be identified and triaged for conservation funding and effective development and implementation of management actions to protect for threatened invertebrate species.

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