Communiqué
EIANZ 2025 Insects in Crisis Symposium

Environment Institute of Australia and New Zealand Inc.

BACKGROUND

Insects are in crisis

Insects play a crucial role in ecosystem function and in agricultural production. They help to maintain healthy soil, recycle nutrients, pollinate flowers and crops, control pests and decompose organic matter.

Although some insect species are abundant and others can be destructive in plague proportions or as vectors of disease, many insect populations are in fact considered to be threatened.

The world is in the midst of experiencing an alarming decline of insect species, with Australia and Aotearoa New Zealand no exception. Catastrophic global declines in insects are so dramatic that almost 150 species were estimated to become extinct in 2024 in Australia alone (Woinarski et al, 2024, *Cambridge Prisms: Extinction*).

And given the paucity of research into insect conservation, the issue could not be more pressing.

Starting the conversation

In July 2025, EIANZ hosted the Insects in Crisis Symposium in Canberra, bringing together experts to consider conservation challenges and solutions. Discussions covered climate change impacts, invasive species, disease, biodiversity losses, and the need for better taxonomic understanding and protection of invertebrate species.

The symposium underlined the importance of public engagement, collaborative research across disciplines, and innovative approaches to address the declining knowledge of insects and their ecosystems, while also exploring cultural connections and traditional knowledge.

The symposium was held in partnership with the Australian Entomological Society, Invertebrates Australia and CSIRO.

Australian Entomological Society

CSIRO

INVERTEBRATES AUSTRALIA

DEFINING THE PROBLEM

We don't know what we don't know

Quantifying insect population losses is difficult, because fewer than half of the estimated 200,000-plus species have been formally described in Australia and Aotearoa New Zealand. Many collected species await description, and modelling suggests that most haven't been discovered yet. Species cannot be listed as endangered without formal description, creating a vicious cycle where the lack of funding into research results in the scarcity of funding into conservation and the subsequent extinction of species.

Species are being lost that we have not yet recorded or described.

Megafire frequency and intensity

Megafires pose significant threats to insects, especially short-range endemic and flightless species. Research discussed at the symposium conservatively estimated that 60 billion individual insects were lost in the 2019–20 bushfires, with eight beetle species likely to have become extinct in south-east Australian rainforests (Gibb et al 2023, *Austral Ecology*). Other research estimated that 240 trillion arthropods died, destroying entire host plant populations and causing the extinction of approximately 50 host-plant-dependent insects, including fire-adapted species (Dole et al 2023, *COIS*).

Research gaps

Insect adaptation to climate change is poorly understood. Fire, heatwaves, drought and floods adversely impact insects and the plants, microenvironments of ecological communities, and even the bacteria on which they rely. More research is needed on hard and soft limits to adaptability under extreme Australian conditions, considering summer diapause, epigenetics and species-specific lifecycles.

Fortunately, some Australian insects have demonstrated the potential to adapt to climate change through physiological and behavioural changes, with evidence showing species replacement within groups such as ants.

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There have also been successful examples of translocation. Maintaining genetic diversity in such programs is important for the conservation of species that may exist only in small, isolated patches, and for which a river may represent an insurmountable barrier.

Data collection crisis

As symposium keynote speaker Ary Hoffman noted, we have limited information about insects, and knowledge gaps mean that we may lose species not yet known to us. Even with a traditional bias towards pest species and certain insect orders such as moths and butterflies, there are substantial gaps within the better researched orders.

For example, the Australian Museum estimates that there are more than 10,000 Australian species described within the Order Lepidoptera, and an additional 10,000 undescribed species. It's thought many more are yet to be recognised, and the total number of Australian species may be as high as 30,000.

Part of the problem is that many insect species are small, dull-coloured and cryptic (hard to find and/or to differentiate from other similar species). However, even large and more charismatic insects have proven to be elusive, as evidenced by the recent discovery of a huge stick insect in the northern rainforests of Queensland.

A state-of-the-art CSIRO facility in Canberra now houses the Australian National Insect Collection, but only some records are digitised. The small number of taxonomists employed restricts species description work. This is the case even though every dollar invested in taxonomy brings $4–$35 in economic benefits through biosecurity, agriculture and conservation.

Inadequate protection

Current protection processes are primarily designed for plants and vertebrates. And they have strict evidence requirements that are difficult to meet when classifying and protecting insects. The symposium heard how existing protection processes should be reviewed and adapted to ensure they are better able to protect Australian insects and other invertebrates.

Alternative approaches include listing families or genus rather than individual species; broadening protections afforded to threatened ecological communities (TECs); and reviewing current listings across all jurisdictions.

Conservation must prioritise ecologically significant species and habitats, especially short-range endemics that have lost more than 90% of habitat.

SOLUTIONS AND STRATEGIES

Conservation approaches

There is some good news: Insects are adaptable and evolve quickly. We can assist by pushing soft survival limits while recognising hard limits such as habitat requirements. Even small habitat patches – perhaps a few square metres – can be crucial for insects, and worth preserving.

To support future adaptation, conservation should focus on maintaining refugia, preserving gene flow and translocating species that have limited mobility. Artificial intelligence (AI) is already assisting in certain taxonomic tasks, though its future applications remain uncertain.

Collaboration and innovation

Addressing the insect crisis requires collaboration between government, academics, NGOs and the private sector. Environmental practitioners, taxonomists, regulators, economists, land planners, developers, land managers and traditional owners must all join in the conversation.

The Institute encourages entomologists and environmental practitioners to actively engage and interact with each other during impact assessment processes. In fact, entomologists should participate in the scoping of impact assessments to improve the protection of insects.

Improved sharing of information via online platforms such as iNaturalist (iNaturalist.org), and targeted approaches to digitisation, collaboration, and innovation are required to address the growing challenges in biodiversity data management and conservation.

Professional challenges

Environmental practitioners face key questions:

- How to include insects in impact assessments when species aren't formally described?
- When should entomologists be involved in impact scoping?
- Are policy makers sufficiently skilled for insect-related policy?

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- How can land managers integrate insect protection into management plans?

A SILENT CRISIS

The insect world, and by extension the ecosystems in which they exist, are truly in crisis – a silent crisis. At the same time, there are formidable barriers to their conservation.

To mitigate further losses, we should:

- Identify and protect threatened habitats, especially those rich in small-range endemic and flightless species
- Facilitate the protection of invertebrate species
- Protect and promote flagship species to incentivise public engagement and political will
- Reform the EPBC Act and state/territory legislation to address insect-specific listing challenges.

Insect conservation yields ecological, cultural and economic benefits. Investing in insect conservation can therefore yield substantial benefits across a variety of sectors. That said, the symposium heard that we are experiencing a mass extinction event, which will have an as-yet-unknown impact on higher-order species.

CALL TO ACTION

Entomologists and impact assessors

Consider entomology, and engaging entomologists, whenever scoping impact assessments; establish large-scale monitoring programs combining museum collections, field surveys and genomics to quantify species distributions; advocate for a new National Action Plan for invertebrates (last completed 2002).

Taxonomists

Pursue increased Australian Biological Resource Study funding to restore taxonomic research budgets.

Land planning regulators

Modify land-planning and development-assessment laws to account for impacts on native insects, which comprise 75% of animal species.

Development/infrastructure regulators

Require developers and consultants to explicitly state whether biodiversity assessments and fauna management plans, produced for planning decisions and wildlife management, address the conservation of native and endemic insects.

Environmental policy makers

Develop invertebrate listing criteria to account for limited data; create invertebrate-specific policies rather than retrofitting vertebrate-based systems.

Environmental educators

Renew focus on native insects; incorporate mandatory taxonomy in undergraduate courses; engage primary/secondary students in collection and identification.

Pesticide regulators

Review pesticide importation protocols; require foreign manufacturers of chemicals and compounds to quantify and validate risks to native insects.

LOOKING AHEAD

The path to reversing insect decline and securing a biodiverse future requires navigating complex scientific, regulatory and economic challenges while working against the clock of an unfolding extinction crisis.

Although the scale of the insect crisis is daunting, the solutions discussed at the symposium demonstrate that meaningful progress is achievable through coordinated action.

From reforming legislative frameworks to embracing innovative technologies, and from protecting micro-habitats to engaging the next generation of taxonomists, we have the capacity to make a difference. The challenge now is implementation – transforming symposium discussions into policy reform, research funding, and on-the-ground conservation action.

Many thanks to the symposium technical committee and all participants who contributed to this important and timely event.