Climate Change Adaptation Research Grants Program
- Terrestrial Biodiversity Projects

Project title:
Developing management strategies to combat increased coextinction rates of plant dwelling insects through global climate change.

Principal investigators: Dr Melinda Moir
Lead organisation: University of Melbourne

Objectives:
To develop conservation strategies for identifying which plant-dwelling insects are at greatest risk of coextinction induced by climate change, and identify which management actions will be most cost effective at reducing impacts.

Project design and methods:
We will utilize an existing large empirical dataset of insect-plant associations to identify those species most at risk of climate change-induced coextinction. The insect dataset contains >26,000 individuals representing >1,100 species. These were collected from 3,026 plants, representing 104 plant species of varying threat status, along an altitudinal/rainfall gradient from Torndirrup Peninsular to Stirling Range National Park, areas managed by Albany City Council and WA Department of Environment & Conservation, respectively. The altitude gradient is from 10m above sea level (Torndirrup) to 1099m (Stirling Range), which is relevant to Australian systems as iconic mountains such as the Blue Mountains are of similar height (1100m). Such data allow for the detection of subtle changes in insect assemblages on plants caused by changes in environmental conditions with altitude. We will measure temperature and rainfall along this altitudinal gradient with weather stations (not recorded to date). These factors are likely to alter with climate changee.g.,4, and cause parallel changes in the insect assemblages on plants. We will correlate the weather data gathered with the insect assemblages of various plant species and how that changes with altitude. Climate change-induced extinction of insects on plants in the Stirling Range National Park in particular, has been identified as a possible threatening process within Management Plans produced by WA DEC5.

With our datasets we will also assess which characteristics (e.g., dispersal, host-specificity, environmental tolerance range, life histories of host/insect, host abundance, habitat fragmentation etc) increase an insect species' proneness to coextinction under a changing climate. We will adopt structured decision making e.g.,22 (reviewing results regularly and adapting our field and laboratory investigations in light of these) to develop robust optimal strategies for end users to manage coextinction threat from climate change. Using our dataset we have already provided a framework in assessing those species most at risk of coextinction19, including when their hosts are afforded ex-situ conservation20. Our insect and weather datasets, combined with published literature and expert opinion from our agency partners (David Coates & Karl Brennan: WA DEC; David Keith: NSW National Parks & Wildlife Service (NPWS), and NSW Department of Environment, Climate Change & Water DECCW) will be used to quantify the costs of different combinations of management strategies to minimize the risk of climate-induced coextinctions in this key component of Australia's terrestrial biodiversity. Finally, we will test a climate change adaptation strategy (trial translocation/s) on key insect species in WA in collaboration with WA DEC. A research assistant will be employed on funds from this proposal and they will conduct much of the fieldwork, databasing and collating for this project. Post-graduate students will also be sought to study some plant and/or insect groups in further detail.