



ADAPTATION CASE STUDY SERIES

Climate Change Adaptation Strategies for the Miena cider gum (*Eucalyptus gunnii* subsp. *divaricata*) By Matthew Taylor—Tasmanian Land Conservancy

Study Summary

This project investigated the potential impact of climate change on the distribution of the Miena cider gum (*Eucalyptus gunnii* subsp. *divaricata*), an endemic Tasmanian tree species and one of the most cold tolerant of all eucalypt species. Populations of Miena cider gum have declined dramatically in the past 50 years and the species is now listed as endangered under the federal *Environmental Protection and Biodiversity Conservation Act 1999*.

Examining climate change projections modelled by the ACE CRC Climate Futures for Tasmania project suggested that the distribution of climatically suitable habitat for Miena cider gum may shift to areas of higher altitude and rainfall to the west of its current range. By 2100 temperatures will exceed the current range of the species throughout its present range and will have reduced the area of climatically suitable habitat to a small climate refuge in the western part of the central plateau. This prediction has implications for the future recovery program for the species.



Dieback of Miena Cider Gum at Barren Tier in the Central Plateau, Tasmania (©Matt Taylor)

Recommendations for Adaptation Management

Conservation strategies aimed at adapting to climate change need to improve the resilience of populations by addressing existing threats, many of which have already been identified in the Listing Statement for the species. Two adaptation initiatives are currently being implemented;

1. **Ex situ conservation trials.** Plantations were established by the University of Tasmania at Geeveston and Bothwell in the 1990s and the status of these plantations will be re-assessed this year by the Tasmanian Land Conservancy in partnership with the University.
2. **Collection of seed for storage in the Millennium seed bank.** This work will be conducted by the Tasmanian Land Conservancy in partnership with the University of Tasmania this summer. The Miena cider gum sets seed very rarely and this year we have observed a large seed crop developing.

We further recommend that the following strategies should be considered for adaptation management to climate change:

- Increase monitoring of healthy populations
- Protect existing populations through fencing from stock and managing fire
- Control feral deer in areas where the species currently occurs
- Negotiate conservation covenants or management agreements for populations on private land
- Establish translocation trials in areas that are predicted to remain coldest. Most of these areas are in existing reserves that form part of the Tasmanian Wilderness World Heritage Area
- Investigate the impact of severe drought events
- Collect and store seed at the Royal Botanical Gardens of Tasmania seed conservation facility
- Manage competition with other eucalypt species by culling seedlings of competitive species

Research Overview

Climate change is likely to have the greatest impact on specialist species that occur within a narrow climatic envelope. As the climate warms, the competitive advantage of species that are able to tolerate extremely cold environments will be diminished. The Miena cider gum (*Eucalyptus gunnii* subsp. *divaricata*) is one of the most cold tolerant of all eucalypt species. It occurs in open valleys on the central plateau of Tasmania, where cold air drainage causes severe frosts that inhibit the establishment of other eucalypt species.

At present the species occurs within a narrow climatic range, where annual maximum and minimum temperatures are amongst the coldest in Tasmania. Using modelling developed by the ACE CRC's Climate Futures for Tasmania project, the present climatic envelope of the Miena cider gum was determined. Climate change projections were then used to identify areas where this envelope will occur in the future.

Results and Conclusions

At present the Miena cider gum occurs in areas where the mean annual maximum temperature is 11.8C and the mean annual minimum temperature is 2.4C. The average annual rainfall in this area varies from 721mm in the eastern part of its range to 1412mm in the western part of its range, suggesting that rainfall is less important than temperature in determining the species distribution.

Under projected climate change scenarios for Tasmania, it was possible to determine the location of areas where climatically suitable habitat may be present in the future. The analysis showed the area of potential habitat for Miena cider gum contracting from approximately 730km² at present to 30km² by 2100. This area is in the World Heritage Area, to the west of the current range of the species (Figure 1), and may be important refugia to the Miena cider gum and other highland species if the climate of central Tasmania warms as predicted over the next 100 years.

Further research is necessary to determine whether a warming climate will necessarily make conditions unsuitable for the Miena cider gum throughout its current range. However, it is likely that environmental change will place a further stress on populations that are already in decline.

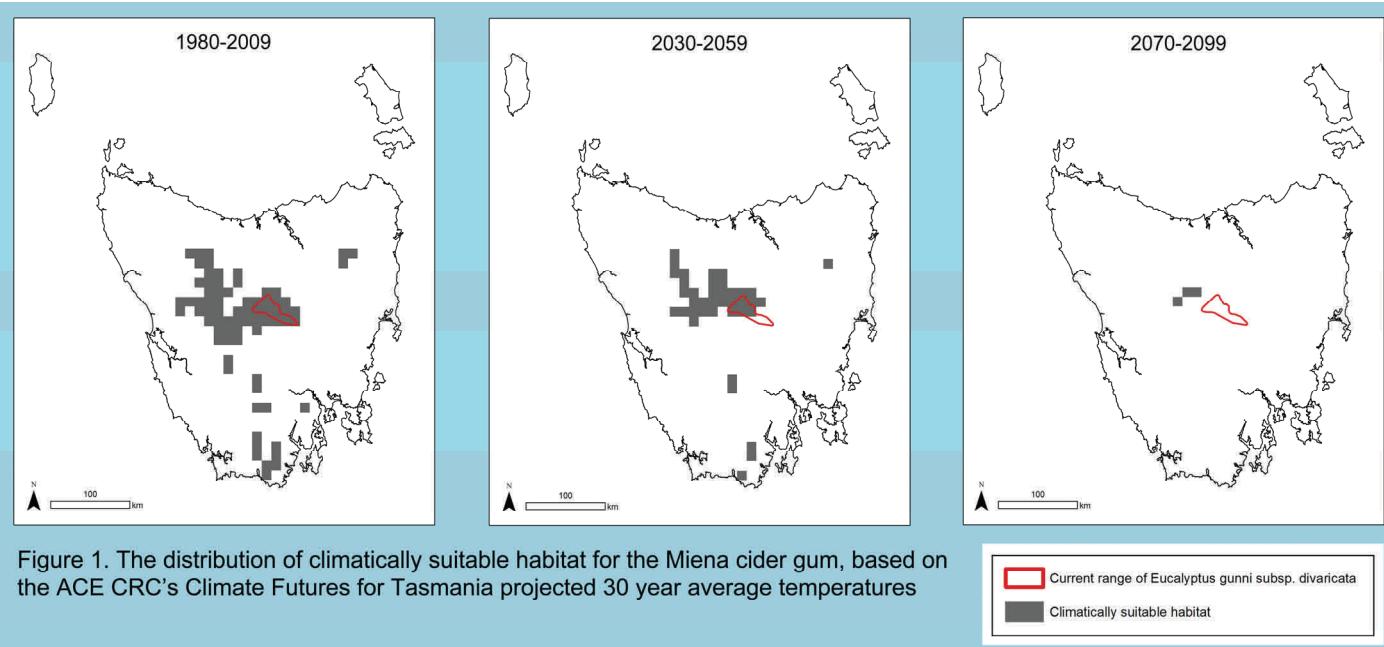


Figure 1. The distribution of climatically suitable habitat for the Miena cider gum, based on the ACE CRC's Climate Futures for Tasmania projected 30 year average temperatures

This research was conducted by Matthew Taylor at the Tasmanian Land Conservancy, in collaboration with Felicity Faulkner, DPIWE - Land Conservation Branch, and supervised by Dr Wendy Potts, DPIWE - Threatened Species Section.

The generation of the Climate Futures for Tasmania climate simulations was commissioned by the Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC), as part of its Climate Futures for Tasmania project.

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