Using ants to find a butterfly

Above Arid bronze azure butterfly.
Photo – Andy Williams/DBCA

New discoveries are often a combination of serendipity and expertise. Such was the case when research on ants led to the discovery of a population of the critically endangered arid bronze azure butterfly (*Ogyris subterrestris petrina*).

Prior to this discovery, the butterfly was only known from a single population of perhaps several hundred individuals in a small nature reserve in the north-eastern Wheatbelt, near Mukinbudin (see 'The ant, the butterfly, the leafhopper and the bulldozer', *LANDSCOPE,* Autumn 2010), which was found by chance in 2006. Historically, the butterfly had a wider distribution – it was originally collected near Kalgoorlie in the 1980s but disappeared from this site by 1993. Before the butterfly was found at Mukinbudin, it was believed that it may have become extinct. Several searches of remnant vegetation in the Mukinbudin area had been undertaken since 2006, but all failed to find any additional populations of the butterfly.

A knowledge of the ecology of the arid bronze azure was critical in this new discovery. The butterfly's caterpillars have an obligate association with a specific ant (the inland form of the bearded sugar ant (*Camponotus terebrans*)). The caterpillars enter the ants' nest from eggs laid near the entrance, where they are fed by (or are predators of) the ants – a very unusual food source among butterflies. Although many butterfly species are quite conspicuous, this is not the case with the arid bronze azure, as it is relatively small, is subdued in colour and has a wingspan of about 36 millimetres. So an alternative method to search for new populations of the butterfly, as opposed to blindly searching for flying adults, is to target colonies of the caterpillars' host ant.

As part of a research project investigating the changes in composition, structure and function of gimlet (*Eucalyptus salubris*) woodlands with time since fire (see 'Woodland recovery after fire', *LANDSCOPE*, Autumn 2015), ecologist Carl Gosper led a team of scientists from DBCA and CSIRO Land and Water to sample ant communities at more than 50 sites along the western margin of the Great Western Woodlands. Among the 37,273 individuals and 232 ant taxa recorded, were 701 bearded sugar ants, collected from 12 sites. These records caught the attention of the department's statistician and butterfly expert Matt Williams. Using the precise locality information collected for each ant colony, he and colleagues Andy Williams and Rebecca Coppen, together with volunteer Hayden Cannon, were able to target their searches for the butterflies, which are usually only found in a limited area around the ant colony.

The first attempt at surveying seven potential sites, near Marvel Loch at the eastern edge of the Wheatbelt, was unsuccessful. One site in particular had habitat very similar to that of the Mukinbudin population, and the host ant was confirmed to be present in abundance, but no adult butterflies were detected. Undeterred, the team searched a site further to the north, and were thrilled to find flying butterflies. A second arid bronze azure population had been found! The full extent of this site has not yet been determined, but it appears to be a much smaller colony than the previously known sites near Kalgoorlie and Mukinbudin. Fewer than 10 butterflies were recorded over an extent of about one kilometre.

As with many aspects of scientific research and ecology, our discovery raises as many questions as answers. Is the 'new' population of recent origin, founded from the pre-existing Mukinbudin one? Or has this population existed undetected for an extended period? Do other populations exist in nearby uncleared vegetation in the Great Western Woodlands? What features of the habitat render it suitable for the butterfly and its host ant? And is such habitat widespread or restricted in distribution? Both of the extant butterfly populations are found in woodland dominated by gimlet. Although gimlet is a widespread tree species across much of the Wheatbelt and Goldfields, suggesting potentially broad habitat availability, both populations are found in gimlet woodland that is regenerating after disturbance, indicating a preference for vegetation of a specific structure of higher density, smaller trees. DBCA scientists will continue with ongoing searches, monitoring and research to address these gaps in knowledge.

Even though there is still much to learn about the arid bronze azure, the discovery of a second population means that the future of the butterfly may be slightly less precarious. Both of the extant populations are vulnerable to a single catastrophic event, such as a bushfire or a sudden collapse of the ant colony, as occurred to the Kalgoorlie site in the early 1990s. However, catastrophic events are less likely to concurrently affect two distant populations. This discovery has shown how information collected for one purpose can be informative for other conservation projects. It also opens the possibility of using known ant colonies, such as the site near Marvel Loch, as target translocation sites to establish new arid bronze azure populations.