

Project Report

Host vines for use in the captive breeding and release program to overcome inbreeding depression in wild populations of the Richmond birdwing butterfly *Ornithoptera richmondia*

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Introduction

The Richmond birdwing butterfly *Ornithoptera richmondia*, the largest butterfly in subtropical eastern Australia, is restricted to south-east Queensland and north-east New South Wales, where it favours lowland rainforest supporting the sole, low-elevation larval food plant, the birdwing butterfly vine *Pararistolochia praevenosa*. In Queensland, the Richmond birdwing is listed as vulnerable under the *Nature Conservation Act 1992*, although it is not listed under equivalent conservation legislation in New South Wales. Loss and fragmentation of habitat in the region since European settlement has resulted in a reduction in the butterfly's range of approximately 60%. More insidiously, forest fragmentation has isolated certain birdwing subpopulations, which over time have become inbred. This has resulted in localised extinction events, causing a further contraction in the butterfly's distribution.

In an attempt to counteract these threats to the species, a captive-breeding and release program is being conducted by the Department of Environment and Science (DES) in Queensland, with the support of the Richmond Birdwing Conservation Network (RBCN) and other collaborators. The program, which commenced in 2010, entails selectively mating adult butterflies from different geographic sources to yield progeny with increased genetic diversity for release to the wild at target localities in south-east Queensland where inbreeding is known or suspected to be exerting a negative impact. If successful, this strategy will increase the number of naturally outbreeding, self-sustaining populations of Richmond birdwings within the species' former range.

To halt further decline of the Richmond birdwing's extent of occurrence and abundance, habitat restoration and an increased availability of larval food resources are also required across the historic distribution of the species. Corridors of suitable habitat must be created or 'stepping stones', comprising clusters of host vines, established through targeted planting programs to provide vital connections between existing habitat remnants. This approach should eventually provide additional areas of habitat for the species and allow the movement of birdwings into and out of previously isolated subpopulations, thereby, facilitating natural outbreeding.

The eventual success of the captive-breeding and release project will depend heavily upon the significant, ongoing efforts of conservation organisations, local governments and the community to increase the extent of Richmond birdwing habitat and availability of larval and adult food resources across south-east Queensland, including in urban areas. It is vital that these two different strategies to promote recovery of the butterfly operate in parallel.

Current Project Objectives

The present project's objectives were to use a grant provided to the RBCN by the Swallowtail and Birdwing Butterfly Trust, a conservation-focused charitable organisation based in the United Kingdom, to provide further support to the DES captive-breeding and release program by purchasing additional potted birdwing butterfly vines for use in the Department's two captive facilities. This extra vine stock should ultimately benefit the project in two ways: a) boosting the quantity of leaf material available as food resources to enable larvae to be raised from first instar to pupal stage, and b) providing more vines with soft leaves to encourage adult female Richmond birdwings to lay eggs.

Results and Discussion

In May 2018, the Swallowtail and Birdwing Butterfly Trust donated £500 to the RBCN to put towards the acquisition of vines to support the Richmond birdwing captive-breeding and release project. At the time of the donation, this funding equated to A\$830.

Propagation of the birdwing butterfly vine is a specialised task because it is quite labour-intensive and requires considerable time. The vines are slow growing, with fragile root systems, and must reach a certain maturity before they can be transferred to larger pot sizes or planted out into the ground. This typically entails 12 to 18 months of careful nurturing. The RBCN only sources these larval food plants from accredited nurseries, which guarantees that the plants are of high quality. As a consequence, suitable birdwing butterfly vines are relatively expensive to purchase.

Proplants Nursery, based in south-east Queensland, was the RBCN's preferred supplier of birdwing butterfly vine stock. It offered vines beyond two years of age in 180mm pots (i.e., a size suitable for growing-on in the captive facilities) at a price of A\$7.50 each. A total of 100 potted vines was ordered at a total cost of A\$750, although due to the limited availability of stock and the inherent slow propagation rate, these were supplied in three separate instalments over a period of six months. The first batch of 50 potted vines was collected from the nursery on 22 November 2018 (Figure 1.) These were shared between the Department's two Richmond birdwing rearing facilities, one at David Fleay Wildlife Park (West Burleigh, Gold Coast) and the other at Moggill (in the western suburbs of Brisbane). A second batch, comprising 35 vines, was collected from Proplants Nursery on 5 February 2019 for use in the Moggill facility. The third and final collection, of 15 potted vines, took place on 28 May 2019. These plants were initially delivered to the Moggill facility but were later transferred to David Fleay Wildlife Park. Remaining funds (A\$80) were used to purchase potting mix, fertiliser and shade cloth for the purposes of vine maintenance at the two captive facilities.

After acquisition, the young vines at each facility were either grown up or along cords suspended from the roof of the enclosures or grown up a trellis system of vertical and horizontal cords (Figures 2 and 3). The former approach has proved useful in encouraging egg-laying by adult female Richmond birdwings in captivity, whereas the latter is better suited to intensive captive husbandry of larvae kept in mesh rearing sleeves (Figure 4).

Within six months, it is hoped that the newly acquired vines will benefit the ongoing captive-breeding and release project by providing abundant leaf material to enhance both the quantity of larval food resources available and/or opportunities for oviposition. In addition, the vines growing on long cords may be deployed in the wild as 'decoys' to attract adult female birdwings to lay eggs, a strategy that previously has proven useful for obtaining founder stock of Richmond birdwings for rearing and subsequent mating in the captive facilities (Figure 5).



Figure 1. First batch of young birdwing butterfly vines acquired in November 2018 using grant money donated by the Swallowtail and Birdwing Butterfly Trust. Photo: Ian Gynther, DES.



Figure 2. Some of the newly acquired birdwing butterfly vines set up on a trellis system in the Department of Environment and Science facility at Moggill. Photo: Ian Gynther, DES.



Figure 3. A different view of the same newly acquired birdwing butterfly vines shown in Figure 2. Photo: Ian Gynther, DES.



Figure 4. Older, established potted vines in the Department of Environment and Science facilities for captive-breeding or rearing of Richmond birdwings. A. Flight enclosure at David Fleay Wildlife Park. B. Larval rearing enclosure at Moggill, showing rearing sleeves in use. Photos: Ian Gynther, DES.



Figure 5. Older, leafy, birdwing butterfly vines deployed as 'decoys' adjacent to known Richmond birdwing habitat to attract egg-laying by adult female butterflies. Photo: Honey Melnacs.

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