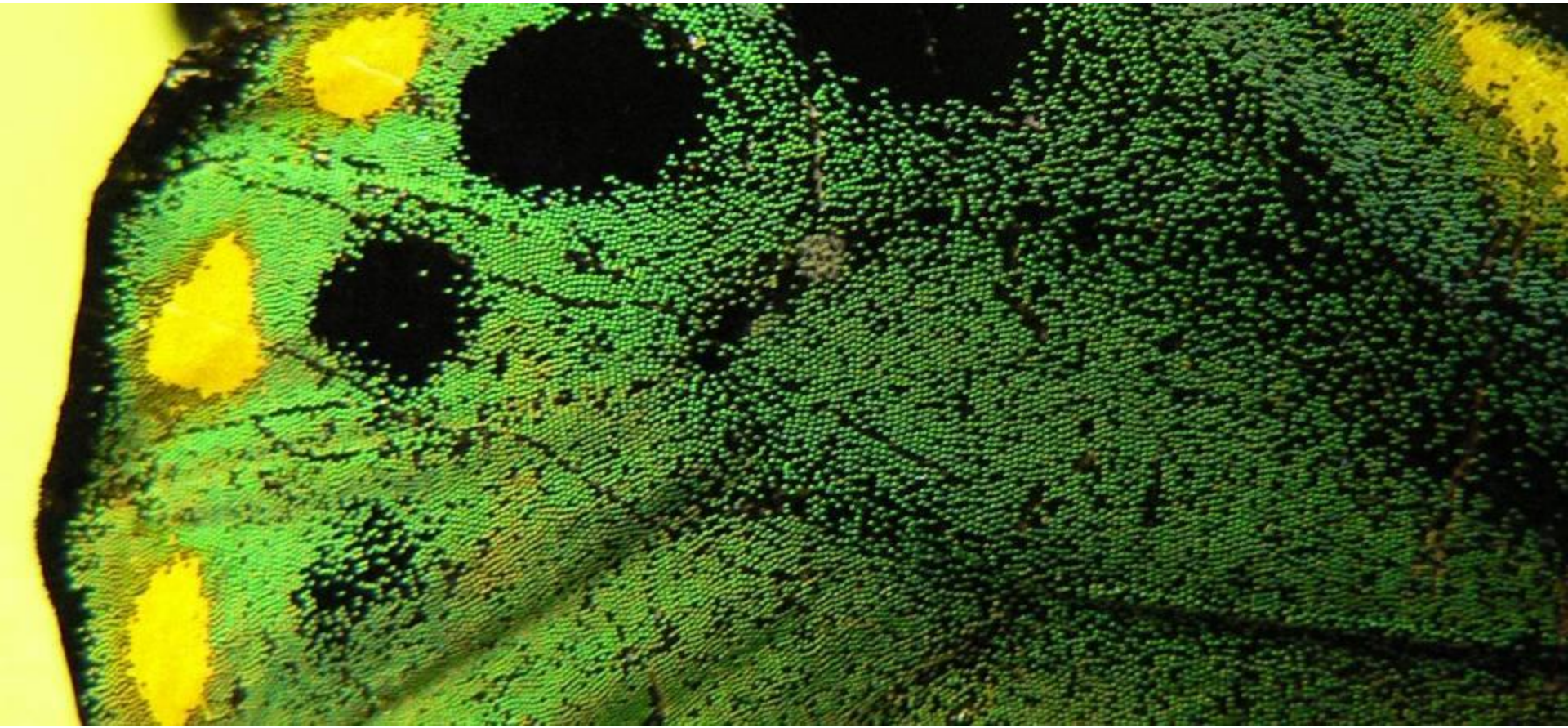


The Richmond Birdwing *Ornithoptera richmondia*

An overview of its natural history and summary of the captive-breeding and release program

Male

Wingspan approx. 125mm

Female

Wingspan approx. 140mm

Images: James Dorey

Upperwing views

Male

Wingspan approx. 125mm

Female

Wingspan approx. 140mm

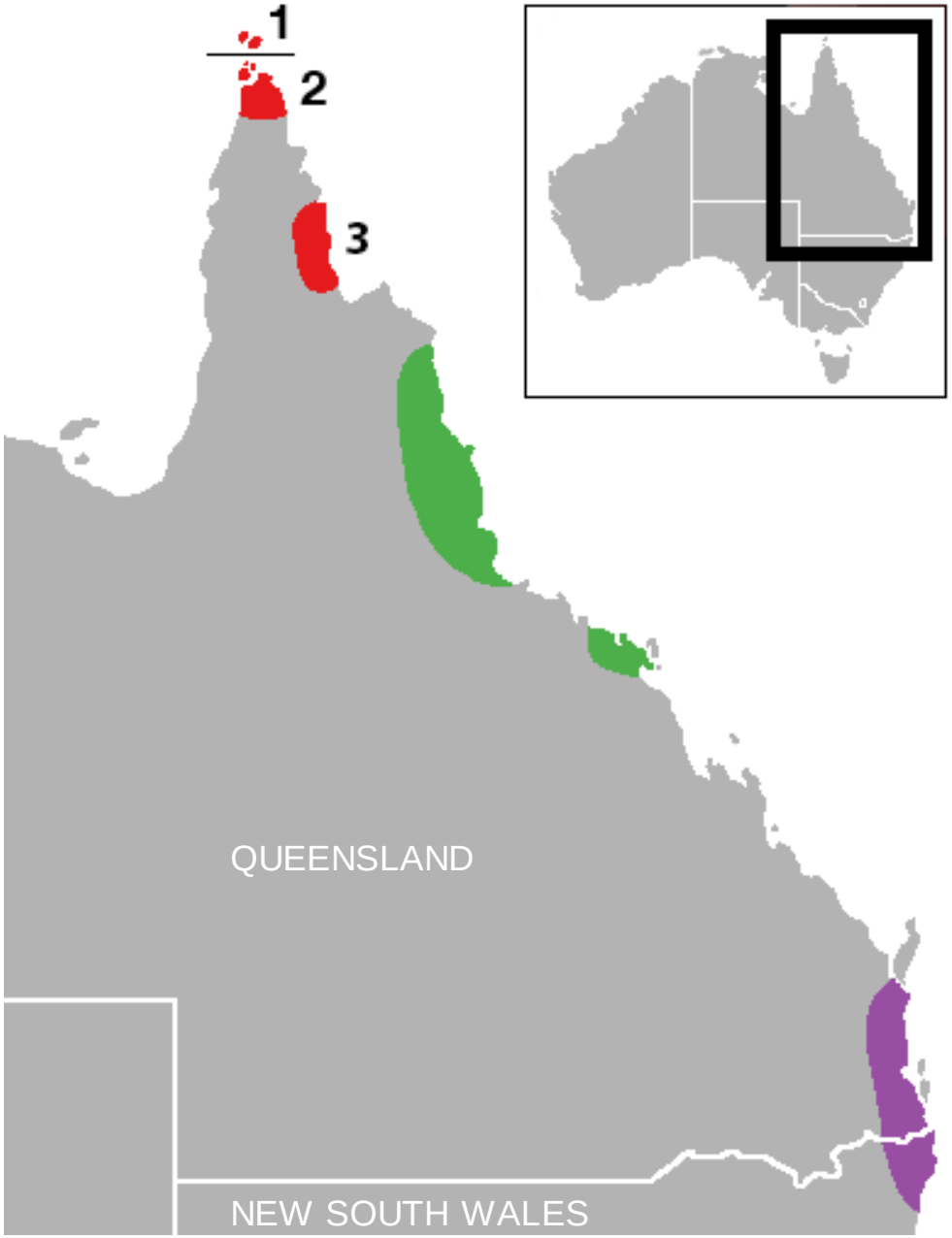
Images: James Dorey

Underwing views

Distribution of birdwing butterflies in Australia

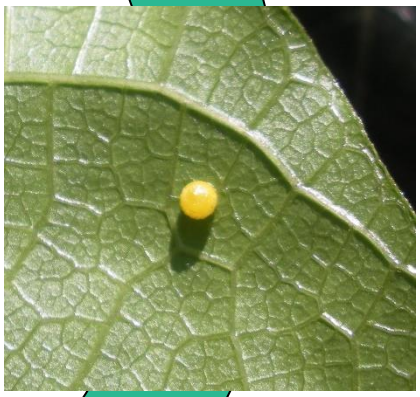
We have three *Ornithoptera* spp

- New Guinea birdwing *O. priamus*
- Cairns birdwing *O. euphorion*
- Richmond birdwing *O. richmondia*



Life cycle

Adult



Egg

Larva

Pupa

Four stages

Eggs

- Laid on underside of leaves of food plant
- Usually one egg laid per leaf
- Bright yellow initially, but appearance changes closer to hatching
- Hatch in about 7 days

Larvae

- Usually moult through 5 stages called instars
- First instars are only 2mm long
- Fifth instars may measure 75mm
- Development takes 25–50 days

1st instar

Images: Richard Bull

3rd instar

Image: Ashley Bunce

5th instar

Preparing to pupate

- Last instar larva spins silk attachments to underside of leaf
- It then becomes a prepupa
- After several days, the larval skin is moulted to reveal the pupa or chrysalis

Images: Richard Bull

Pupa or chrysalis

- Bright green
- Metamorphosis to adult takes 22–40 days during spring/summer
- Metamorphosis takes 120–300 days when over-wintering
- This is achieved by entering diapause

Adult emergence

- A pupa darkens when approaching time for emergence of adult
- Then, it is possible to sex individuals by colour of wings visible through pupal skin
- At eclosion, the skin splits along dorsal side and the soft adult squeezes out

Images: Richard Bull

Adult emergence

- Blood is pumped into crumpled wings to expand them
- The wings attain full size in a few minutes, but are soft and delicate.
- The butterfly must hang down to allow the wings to harden without creases or it will be unable to fly

Images: Richard Bull

Mating

- Females may be mated immediately after eclosion
- Egg-laying or oviposition commences within several days
- The life cycle begins again

General ecology

- Adults generally fly from late August to May
- Occur from the coast to 1200m elevation, but only east of the Great Dividing Range
- Usually three generations per year at lower elevations
- One or now usually two generations per year at high elevations

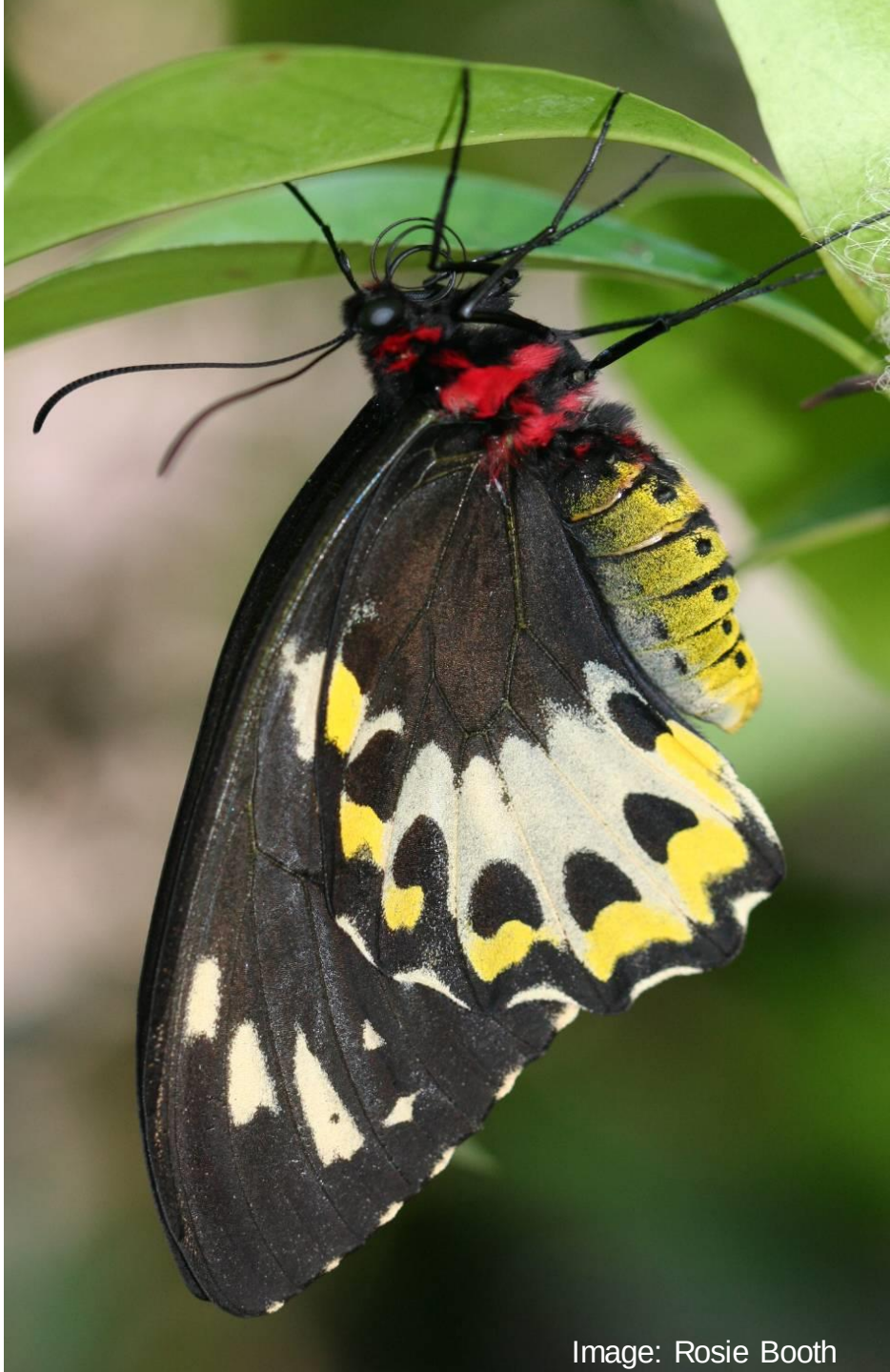


Image: Rosie Booth

General ecology

- Males tend to remain within the general area of origin
- Females can disperse at least 30km, sometimes over inhospitable areas
- Occasionally, both sexes are known to mass migrate

Image: Todd Burrows

Adult food plants

- Adults feed on nectar from flowering trees, shrubs and other plants
- A wide range of native plants provide food resources for these butterflies
- Adults are also attracted to blooms of some exotic garden plants

Scientific Name	Common Name	Possible height (metres)
Alloxylon pinnatum	Red Silky Oak or Dorrigo Waratah (highland habitat)	6–24
Brachychiton acerifolius	Illawarra Flame Tree	10–40
Castanospermum australe	Black Bean	8–20
Clerodendrum floribundum	Lolly Bush or Smooth Clerodendrum	2–10
Diploglottis australis	Native Tamarind	35
Doryanthes excelsa	Gymea Lily	2–4
Elaeocarpus grandis (*E. angustifolius*)	Blue Quandong	35
Eucalyptus and *Corymbia* spp.	Eucalypt and bloodwood spp.	2–80
Eucalyptus grandis	Flooded Gum or Rose Gum	50–80
Grevillea hilliana	White Yiel-Yiel	8–30
Grevillea spp.	Grevillea spp. and hybrids	0.5–35
Hymenosporum flavum	Native Frangipani	10
Melaleuca quinquenervia	Broad-leaved Paperbark	10–15
Melaleuca spp.	Bottlebrush spp.	1–35
Melia azedarach	White Cedar	12–30
Melicope elleryana	Pink Euodia or Pink Evodia	25
Melicope micrococca	White Euodia or White Evodia	30–35
Pavetta australiensis	Butterfly Bush	7
Stenocarpus sinuatus	Wheel of Fire or Firewheel Tree	35
Syzygium australe	Brush Cherry or Scrub Cherry	25
Syzygium luehmannii	Riberry or Small-leaved Lilly Pilly	30
Syzygium spp.	Lilly pilly spp.	3–35
Toona ciliata (*T. australis*)	Red Cedar	40–60
Waterhousea floribunda	Weeping Lilly Pilly	30
Xanthorrhoea spp.	Grass tree spp.	1.5–5

Adult female feeding on blossom of a lilly pilly

Larval food plants

- Larvae are wholly dependent on either of two rainforest food plants
- At low and mid elevations (<600m), only the Birdwing Butterfly Vine *Pararistolochia praevenosa* is eaten
- At higher elevations (>600m), the Mountain Butterfly Vine *P. laheyana* is the sole food plant
- Richmond Birdwings can only breed successfully in locations that support these vines


Birdwing Butterfly Vine


Mountain Butterfly Vine

Image: Harry Hines

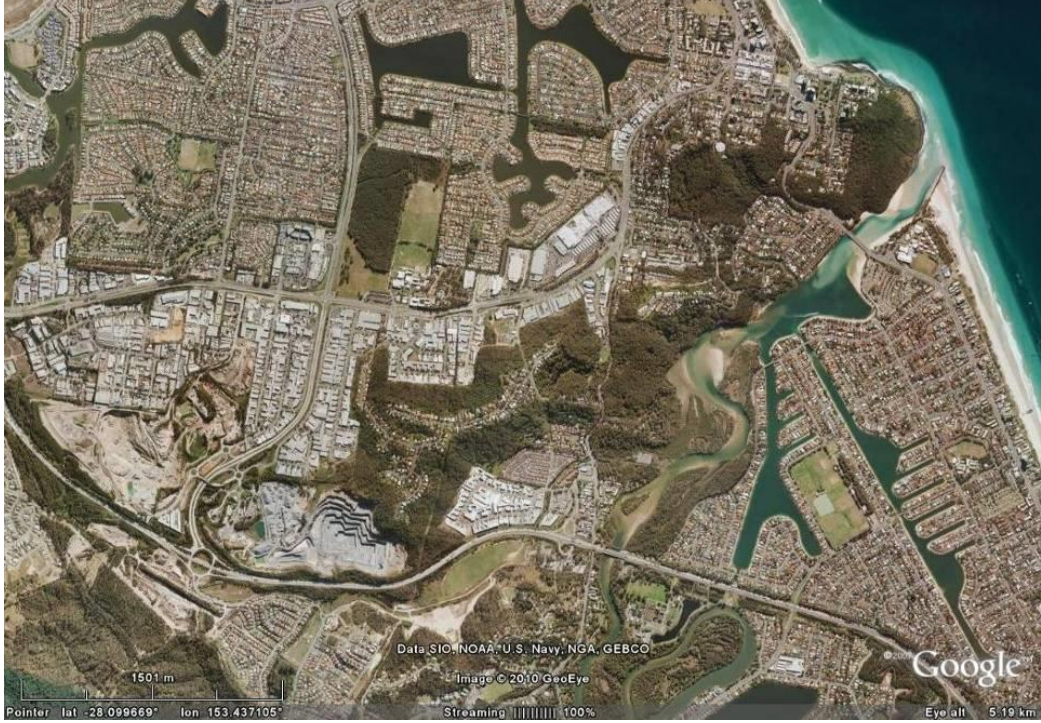
Distribution of the Richmond Birdwing

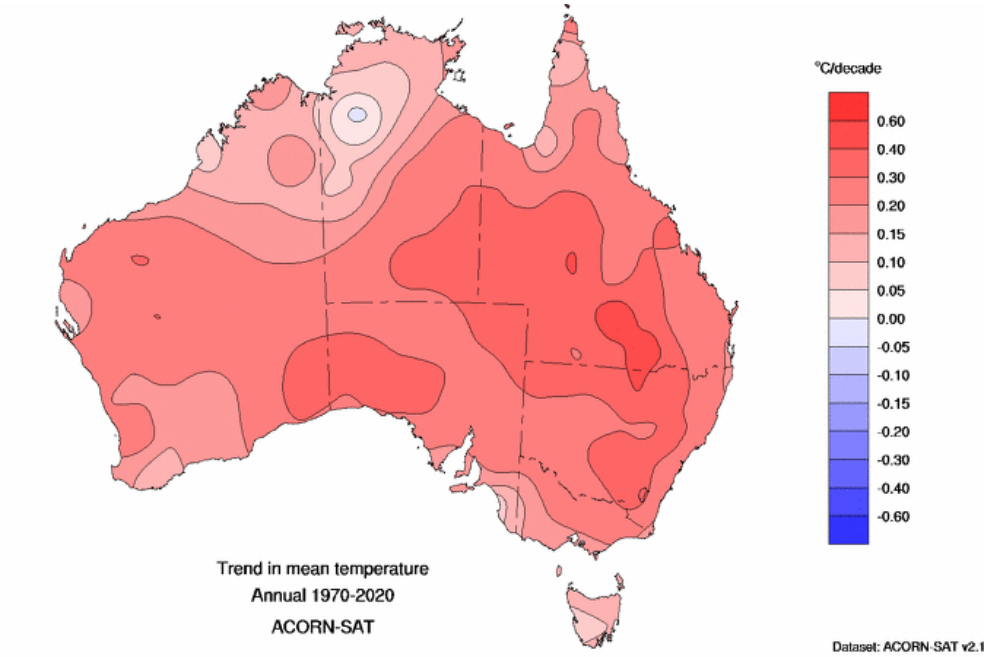
A species under threat

- Present distribution reduced from historic extent and broken into separate subpopulations
- Range contractions from northern and southern extremes
- Some local extinctions in between
- Listed as ‘vulnerable’ in Queensland

Threats

- Habitat destruction and fragmentation
- Inbreeding depression
- Climate change
- Host plant confusion





What is inbreeding depression?

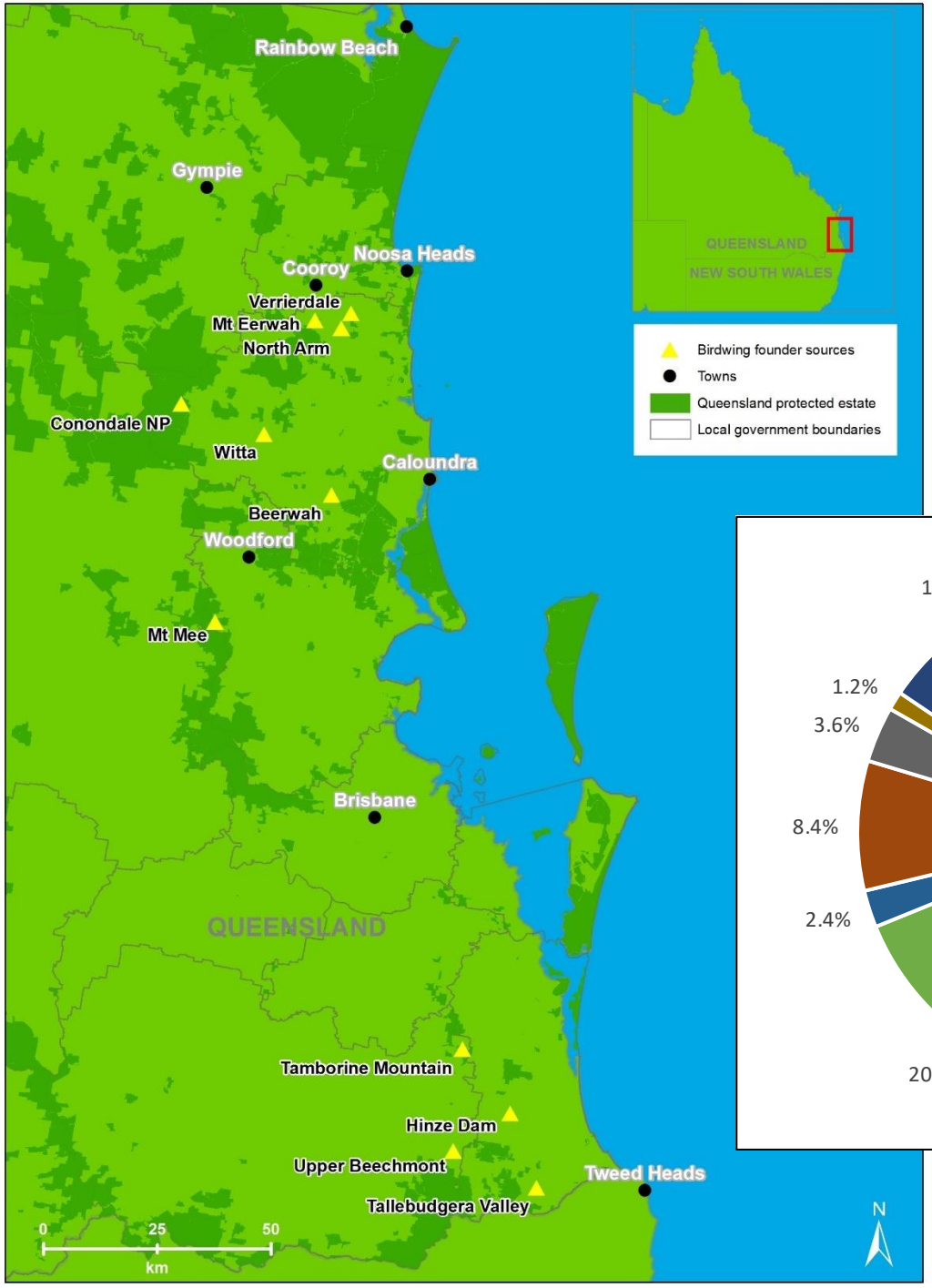
- Occurs when the number of individuals in a local population is small and no genetic exchange with other populations takes place
- Negative impacts result, e.g.:
  - Decreased egg viability
  - Retarded larval development
  - Premature larval mortality
  - Pupation failure
  - Reduced adult size and fitness
  - Loss of adult vigour
  - Reduced adult fecundity
- May lead to local extinction of a population

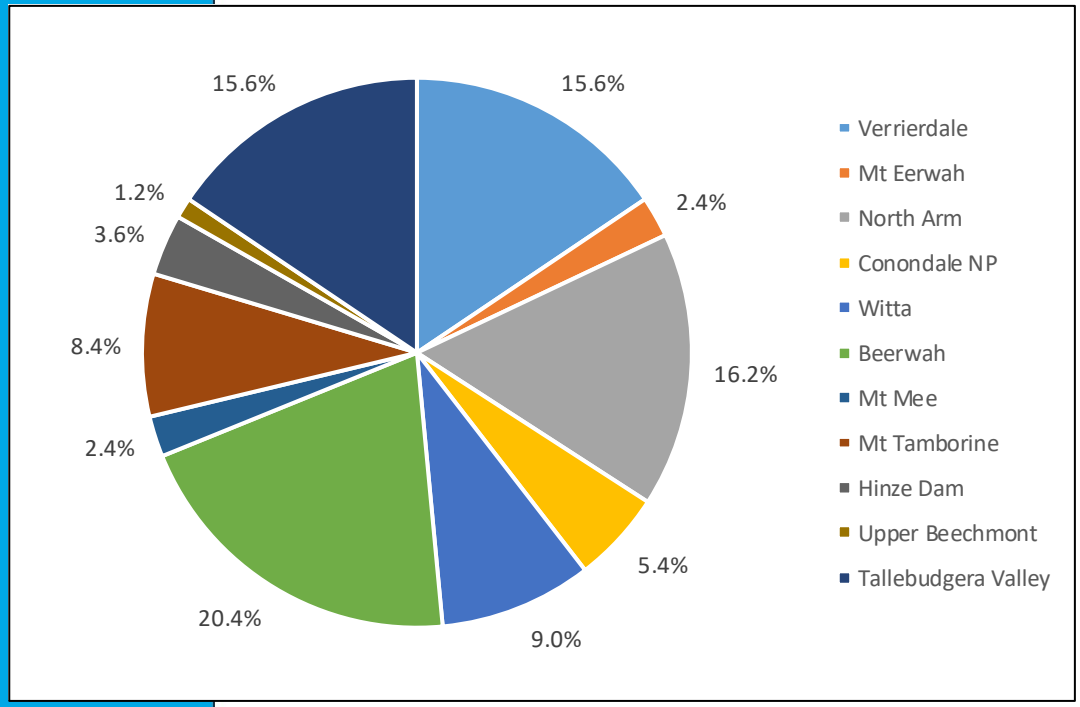

Image: Jessa Thurman

Aims of the DES captive-breeding project

- Use selective mating and captive-rearing to overcome inbreeding depression
- Mate unrelated adults, achieve egg-laying by female butterflies and then rear the resulting larvae in captivity
- Translocate these larvae to key sites
- Re-establish and/or reinvigorate wild populations to improve conservation prospects for the species

Sources of founder stock for captive-breeding



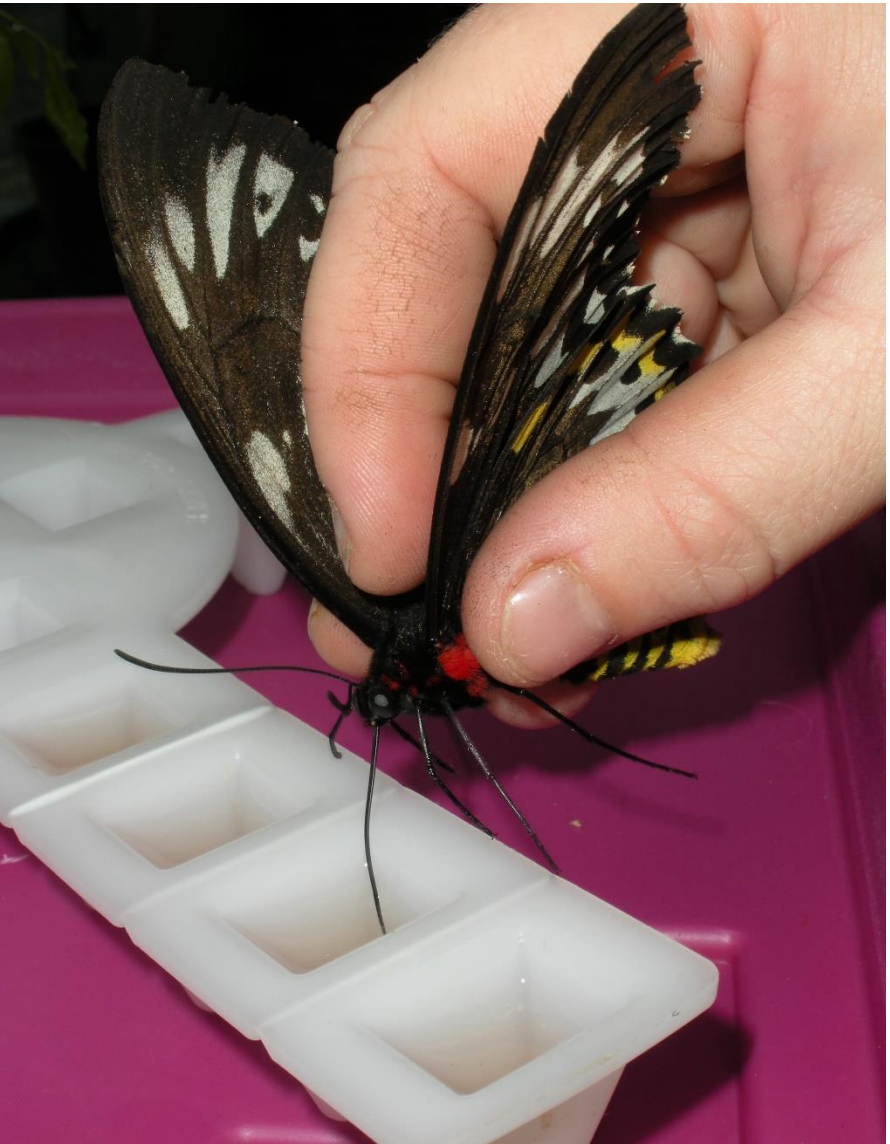


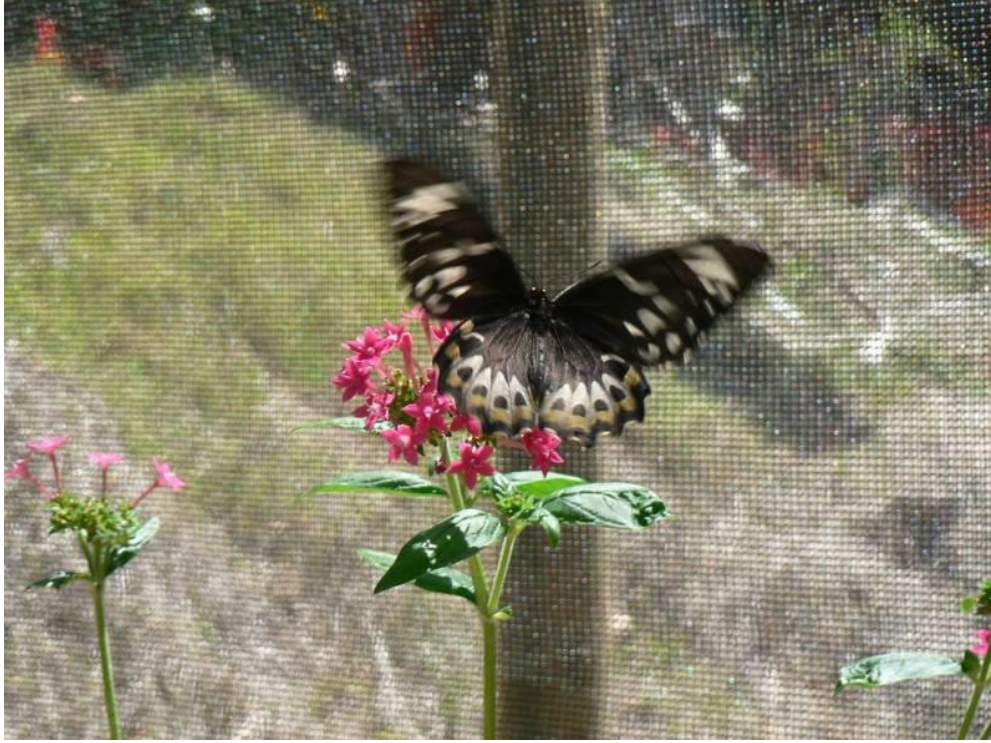
Captive husbandry

- Facility preparation
- Vine care
- Management of the Richmond Birdwing's four life stages
- Predator control
- Genetic management

Captive husbandry

Captive husbandry





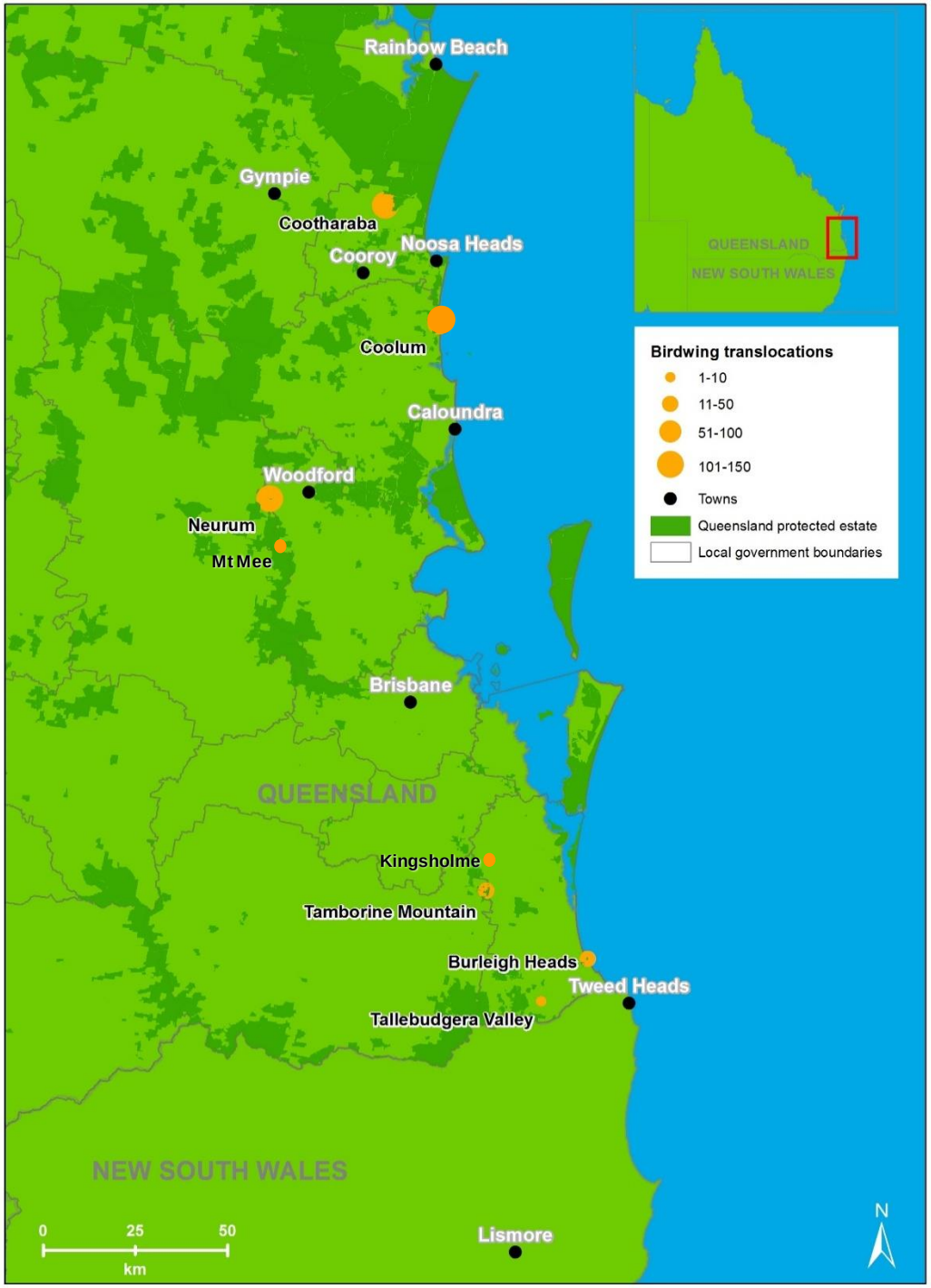
Selective mating (outbreeding)

Outbred progeny
(F1 generation)

Translocating captive-bred outcrossed Richmond Birdwing larvae

Images: Ashley Bunce

Translocating captive-bred outcrossed Richmond Birdwing larvae



Translocations of captive-bred Richmond Birdwings 2010–2018

Types of translocation

- Reintroductions
- Supplementations

Translocation statistics 2010–2018

Site	Locality	Translocation Type	No. of Individuals
Dangerbridge Nature Refuge	Cootharaba	Reintroduction	127
Road Reserve	Coolum	Reintroduction	25
Yaroomba Bushland Park Conservation Reserve	Yaroomba	Reintroduction	69
Yinneburra Bushland Conservation Reserve	Point Arkwright	Reintroduction	9
Neurum Creek Conservation Park	Neurum	Reintroduction	101
D'Aguilar National Park	Mt Mee Section	Supplementation	41
Wongawallan Conservation Reserve	Kingsholme	Supplementation	24
Tamborine Rainforest Skywalk & Tamborine National Park	Tamborine Mountain	Supplementation	50
Burleigh Head National Park	Burleigh Heads	Supplementation	48
Tallebudgera Valley	Tallebudgera Valley	Supplementation	3
Total			**497**

Results of translocations

- After long absences, butterflies again present at reintroduction locations
- Adults and larvae observed at distances up to 20km away soon afterwards
- Monitoring has revealed evidence of ongoing natural breeding at release sites
- Anecdotal reports of increases in numbers of birdwings seen in areas surrounding supplementation locations

Project currently on ‘pause’ for a facility upgrade

Next steps

- Restart the captive breeding program using the refurbished facilities at David Fleay Wildlife Park
- Obtain founders from ‘new’ wild populations, i.e. with different genetics than sourced previously
- Continue outbreeding efforts to boost genetic diversity of the species in the wild
- Conduct annual monitoring of translocation sites
- Encourage and support RBCN, local governments, conservation groups and the community to continue planting vines to expand available food resources and naturally reconnect isolated subpopulations of Richmond Birdwings

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Image: Jessa Thurman