

# The Carpentarian Gap is no gap for two small lycaenid butterflies

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## Abstract

The 'Carpentarian Gap' describes the separation of populations or pairs of sister species in the Top End from north-east Queensland by a belt of semi-arid plains and hill country in the hinterland of the Gulf of Carpentaria. Northern, less arid parts of the hinterland may also serve as a corridor connecting such populations. I report an abundance of observations and individuals of the Spotted Pea-blue (*Euchrysops cnejus*) and Black-spotted Grass-blue (*Famegana nisa*) within the Carpentarian Gap, suggesting that, contrary to existing range maps, the Gulf hinterland serves as a corridor rather than a gap for them. These observations demonstrate a need for more survey effort for butterflies in this region.

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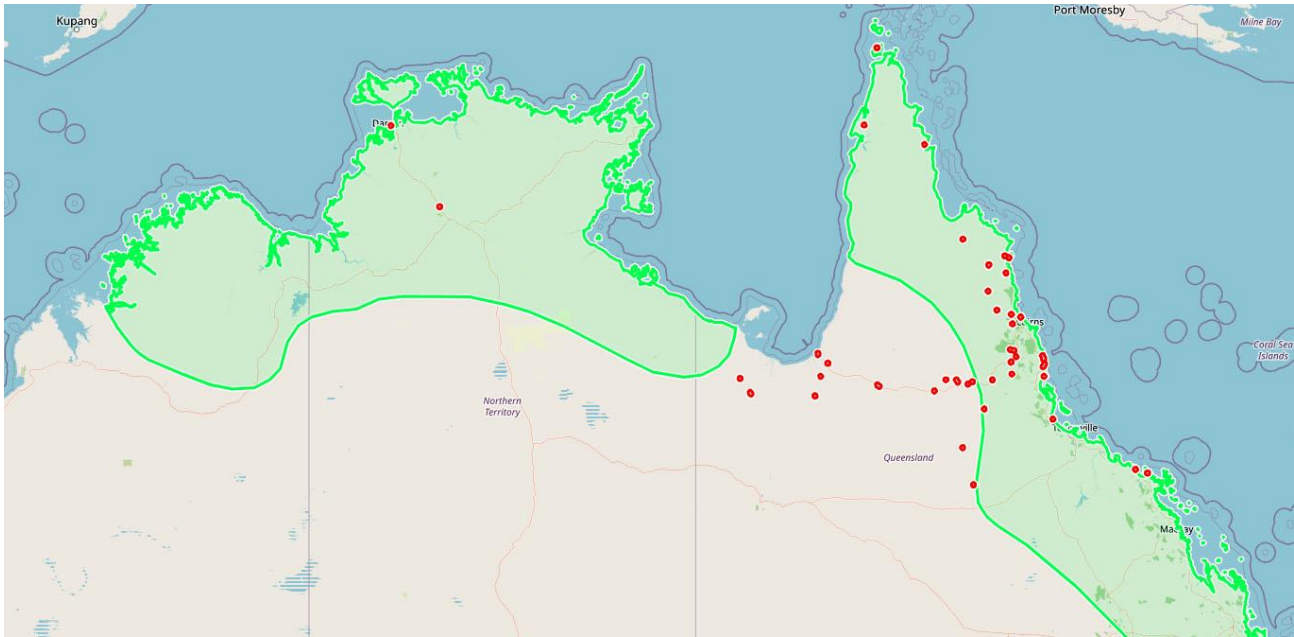
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Extensive plains in the hinterland of the Gulf of Carpentaria are both more arid than nearby areas in the Top End of the Northern Territory and north Queensland including Cape York Peninsula, and less arid than areas to their south. As such they may function as a barrier – the Carpentarian Gap – separating terrestrial animals and plants that occur in higher rainfall areas of the Top End and north Queensland, or as a corridor connecting them (Bowman *et al.* 2010). During glacial 'Ice Ages' including as recently as 10,500 years ago, the Gulf has been intermittently reduced by lower sea levels to a brackish or freshwater lake (Chivas *et al.* 2001; Reeves *et al.* 2008), lower sea levels being associated with a substantially drier climate in the area (Jones & Bowler 1980). Thus, the barrier/corridor effect may have fluxed over time, generating sometimes complex processes of speciation across northern Australia. Pairs of populations separated by the Carpentarian Gap may be represented by distinct but closely related species, by distinct subspecies, or no taxonomic distinction may be recognised. A variety of such patterns have been recognised in plants (Crisp *et al.* 2001), butterflies

(Braby 2008), birds (Keast 1961), frogs (Catullo *et al.* 2014) and other vertebrate groups (Cracraft 1991).

The Spotted Pea-blue (*Euchrysops cnejus*) and Black-spotted Grass-blue (*Famegana nisa*; until very recently known as *F. alsulus* (Hsu 2000)) are two small lycaenid butterflies with populations in both the Top End and north Queensland. Range maps indicate that these populations are separated (Dunn & Dunn 1991; Braby 2000; Orr & Kitching 2010; Butterflies Australia 2023) though no taxonomic distinction is recognised within either species. The most up-to-date maps, those of Butterflies Australia (2023) (see Sanderson *et al.* 2021), suggests that the Spotted Pea-blue occurs west of Doomadgee in far north-western Queensland, and east and north of Mount Surprise and Kowanyama (in the Einasleigh Uplands and on Cape York Peninsula, respectively) (green areas in Fig. 1), a gap of almost 600 km, a classic, extended Carpentarian Gap. The map for Black-spotted Grass-blue suggests a more complex pattern with its occurrence in a corridor along the base of the Gulf of Carpentaria to Normanton and Karumba in Queensland but a gap east from there to Undara in



**Figure 1. Range map (green outline, shaded areas) and Butterflies Australia records (red circles) for the Spotted Pea-blue (*Euchrysops cnejus*) in tropical Australia.** All extra-limital records were contributed by the author except one at Mount Surprise. Range polygons and records are from Butterflies Australia (2023); base map © OpenStreetMap (<https://www.openstreetmap.org/copyright>).

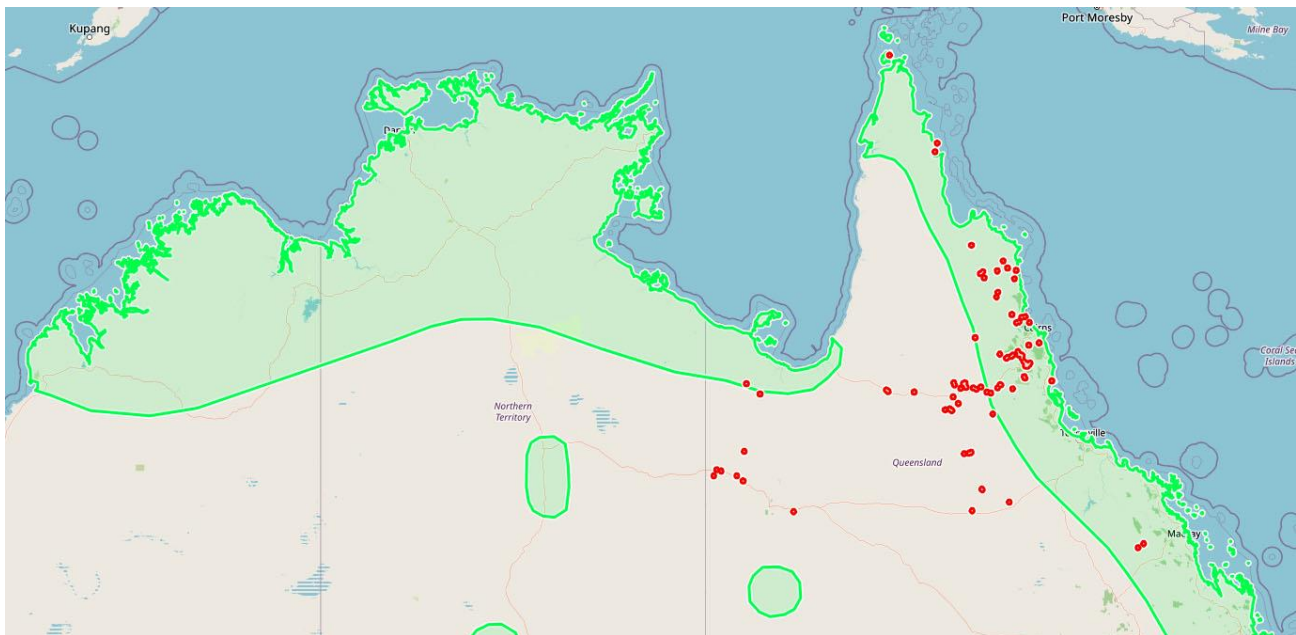
the Einasleigh Uplands (Fig. 2), a distance of 375 km, and also scattered records further inland. In this article I report records of both species so numerous in the gaps, and across a number of years, as to suggest continuity between populations.

The identity, abundance and location of butterflies present were recorded at Talaroo Station from 2016 to 2019 (Franklin & Morrison 2019), during numerous visits to western parts of the Einasleigh Uplands (mostly from Undara to Croydon, also south to Blackbraes and Porcupine Gorge National Parks) from 2018 to 2022, and in far western Queensland over five weeks in August and September 2023. During the latter trip I also identified the plants whose flowers these two species were attending. Records from 2018 to 2022 have been lodged with Butterflies Australia (2023); details of individual records including additional (but poorer) photos of some may be viewed there or at the Atlas of Living Australia (2023), both of which are open access.

I found the Spotted Pea-blue (Fig. 3) at 18 extra-limital locations well-dispersed across the gap in recorded distribution (Fig. 1 plus one additional record in Franklin & Morrison 2019) and across a number of years. Mostly only one to five individuals were seen, but I estimated eight individuals near

Running Creek between Gregory and Burketown in far north-western Queensland, and fifteen at each of Porcupine Gorge National Park north of Hughenden and hilltopping on Black Mountain near Croydon. Of seven occasions in far western Queensland when I noted floral associations, three were of it nectaring and four were of behaviour – persistent attendance at flowering plants but with no or infrequent visits to the flowers – suggestive of egg-laying (Table 1).

The Black-spotted Grass-blue is widespread and abundant extra-liminally in the western Einasleigh Uplands. I recorded it there at 49 sites (Fig. 2 plus records in Franklin & Morrison 2019) spread across a number of years. At Talaroo Station (extra-limital by 75 km), it was *the most* abundant of 40 butterfly species recorded (Franklin & Morrison 2019). At Black Mountain near Croydon I estimated that 50 individuals were hilltopping (Fig. 4). At two sites along O'Brien's Creek Road north-west of Mount Surprise, I estimated 50 and 100 respectively were puddling along the bank of seasonal streams. At a natural field of pea flowers (species unknown) in the Newcastle Range east of Forsyth, I estimated 20 individuals were present. Elsewhere, numbers were smaller but the species was detected with a high frequency.



**Figure 2. Range map (green outline, shaded areas) and Butterflies Australia records (red circles) for the Black-spotted Grass-blue (*Famegana nisa*) in tropical Australia.** All extra-limital records were contributed by the author except one each at Undara and Hughenden. Range polygons and records are from Butterflies Australia (2023); base map © OpenStreetMap (<https://www.openstreetmap.org/copyright>).



**Figure 3. Spotted Pea-blue (*Euchrysops cnejus*) nectaring at an unknown species of pea.** Photographed beside the Burke Development Road 86 km SSW of Normanton, Queensland. All photos are by the author.

In far-western Queensland I detected the Black-spotted Grass-blue at nine sites, eight of which are

extra-limital and most much further inland than the species' recorded main range (Fig. 2). From one to a conservative estimate of ten individuals were present, the latter at the most inland site – a hill in Clem Walton Park SW of Cloncurry. At seven sites the species was observed persistently attending flowering peas as if laying eggs (Table 1), and at one of these laying was observed (Fig. 5). At one other extra-limital site the species was puddling along a stream.

My extra-limital records of these two species are so abundant across a number of years as to strongly suggest that the Carpentarian Gap serves as a corridor for them connecting populations in the Top End with those in north-east Queensland. It is possible that some extra-limital and other inland records, particularly my records in 2023, represent expansion of range in years of high rainfall, but even if this is so they still likely provide genetic connectivity across the Carpentarian Gap. This is consistent with an absence of even sub-specific differentiation between these populations. Further, my records of the Black-spotted Grass-blue can be interpreted as extending its known main range considerably further inland. At least some of the sporadic historical records of the species in inland areas, as summarised by Dunn and Dunn (1991) and Braby (2000), might not be as

**Table 1. Plants in flower with which two species of lycaenid butterfly were associated in far western Queensland, Aug. – Sept. 2023.**

Butterfly	Plant	Number of locations	Activity
Spotted Pea-blue ( <i>Euchrysops cnejus</i> )	Common Wireweed ( <i>Sida acuta</i> , Malvaceae)	1	nectaring
	Hyptis ( <i>Mesosphaerum (Hyptis) suaveolens</i> , Lamiaceae)	1	nectaring
	unknown pea, Leguminosae	1	nectaring (Fig. 3)
	New Holland Rattlepod ( <i>Crotalaria novae-hollandiae</i> , Leguminosae)	2	probably laying eggs
	Siratro ( <i>Macroptilium atropurpureum</i> , Leguminosae)	2	probably laying eggs
Black-spotted Grass-blue ( <i>Famegana nisa</i> )	Rhyncho ( <i>Rhynchosia minima</i> , Leguminosae)	4	laying an egg at one location (Fig. 5); probably laying at the other three
	Narrow-leaved Tephrosia ( <i>Tephrosia brachyodon</i> , Leguminosae)	2	probably laying eggs
	New Holland Rattlepod ( <i>Crotalaria novae-hollandiae</i> , Leguminosae)	1	possibly laying eggs



**Figure 4. Black-spotted Grass-blue (*Famegana nisa*) photographed at a hilltopping site, Black Mountain near Croydon, Queensland.**

isolated as Fig. 2 suggests. They include records by T.A. Woodger in the Selwyn Range 95 km S of Cloncurry, which is 94 km SE of my sighting at Clem Walton Park with substantial similar habitat between.



**Figure 5. Black-spotted Grass-blue (*Famegana nisa*) laying an egg on an inflorescence bud of Rhyncho (*Rhynchosia minima*).**

Photographed beside the Barkly Highway midway between Mt Isa and Camooweal.

Both the Spotted Pea-blue and Black-spotted Grass-blue breed on reproductive parts of a variety of peas (family Leguminosae) (Braby 2000), giving them flexibility in breeding options. My observations of them at pea flowers are not proof of breeding as they might have been – and in one case demonstrably were – taking nectar from the flowers. However, persistent behaviour around flowering plants but not at the flowers suggests breeding, and in one case egg-laying was observed. Of the two pea species I observed the Spotted Pea-blue attending, one (the non-native *Macroptilium*) is a known larval foodplant, but the other (the native *Crotalaria novae-hollandiae*) is not. None of the three native plants I observed the Black-spotted Grass-blue attending, including one on which egg-laying was photographed, are known foodplants. The three native plant species are widespread in north-west Queensland (Milson 2000; AVH 2023). It seems likely that further observation will increase the number of larval foodplants of which they are known to make use, and the number of records of these butterflies within the Carpentarian Gap.

## Acknowledgements

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