



Nymphs

(Nymphalidae)

8

Purple Beak

Libythea geoffroyi Godart, 1822



Plate 78 Emma Gorge, El Questro Wilderness Park, WA
Photo: M. F. Braby



Plate 79 Limestone Gorge, Judbarra/Gregory National Park, NT
Photo: M. F. Braby

Distribution

This species is represented by the subspecies *L. geoffroyi genia* Waterhouse, 1938, which is endemic to the study region. It occurs widely but sporadically in the Kimberley and the western half of the Top End, as well as on Rimbija Island in the Wessel Islands, NT. It is locally common in the Kimberley, such as at Windjana Gorge (Williams et al. 2006) and Kalumburu (Yeates 1990), WA, but much rarer in the Northern Territory, where only a few specimens have been recorded from five locations: Judbarra/Gregory National Park (Limestone Gorge) (Braby 2014a), Fish River Station (Braby and Kessner 2012), Palmerston (Meyer et al. 2006), Darwin (Waterhouse and Lyell 1914; Waterhouse 1938) and Rimbija Island (Common and Waterhouse 1981). The geographical range of *L. geoffroyi* corresponds with the spatial distribution of its larval food plant. However, the food plant, although patchy in extent, is far more widely distributed, occurring in the western Gulf Country and coastal areas of the north of the Northern Territory. Further field surveys are therefore required to determine whether *L. geoffroyi* occurs in western Queensland and adjacent areas in the Northern Territory, and elsewhere in the northern coastal areas of the Top End. Outside the study region, *L. geoffroyi* occurs from South-East Asia, through mainland New Guinea and north-eastern Australia to the Bismarck Archipelago, the Solomon Islands, New Caledonia and the Loyalty Islands.

Habitat

Libythea geoffroyi breeds in patches of semi-deciduous monsoon vine thicket on rocky outcrops or gorges composed of limestone, sandstone or basalt usually protected from fire where the larval food plant grows as a small tree in high density (Braby 2014a). Adults have also been collected in coastal areas of higher rainfall (> 1,100 mm mean annual rainfall) where a distinct larger-leaved variety with glabrous, ovate or oblong leaves of the food plant grows on lateritic cliffs and sand dunes; presumably, *L. geoffroyi* also breeds in these habitats.

Larval food plant

Celtis australiensis (Cannabaceae).

Seasonality

Adults are seasonal, occurring from January to August. They are most abundant during the late wet season, particularly in March, when they are usually in fresh condition (Williams et al. 2006; Meyer et al. 2013; G. Swann), after which their abundance appears to steadily decline as the dry season progresses. The breeding phenology and seasonal history of the immature stages are not known. Braby (2014a) found an empty pupal shell in good condition on the underside of a leaf of the larval food plant in early May, indicating recent adult emergence. In northern Queensland, the larvae feed only on new soft leaves following the first substantial rainfall event at the end of the dry season (Johnson and Valentine 1988, 1989). Thus, in northern



Photo: El Questro Gorge, El Questro Wilderness Park, WA, M.F. Braby

Australia it is likely the species breeds seasonally during the height of and/or just after the wet season, when *C. australiensis* produces new leaf growth in response to monsoon rains; however, it is not clear how the species survives the nongrowing period during the dry season, when the leaves are tough and nonedible to larvae. Presumably, only one or two generations are completed annually. Overseas, other species of *Libythea* remain in adult diapause during the nonbreeding period, but this behaviour has not been observed during the late dry season in northern Australia and thus it is not clear whether this strategy is adopted by *L. geoffroyi*. It is possible the eggs—which are tiny and concealed deep within the axils of leaf buds—remain in diapause during the long dry season.

Breeding status

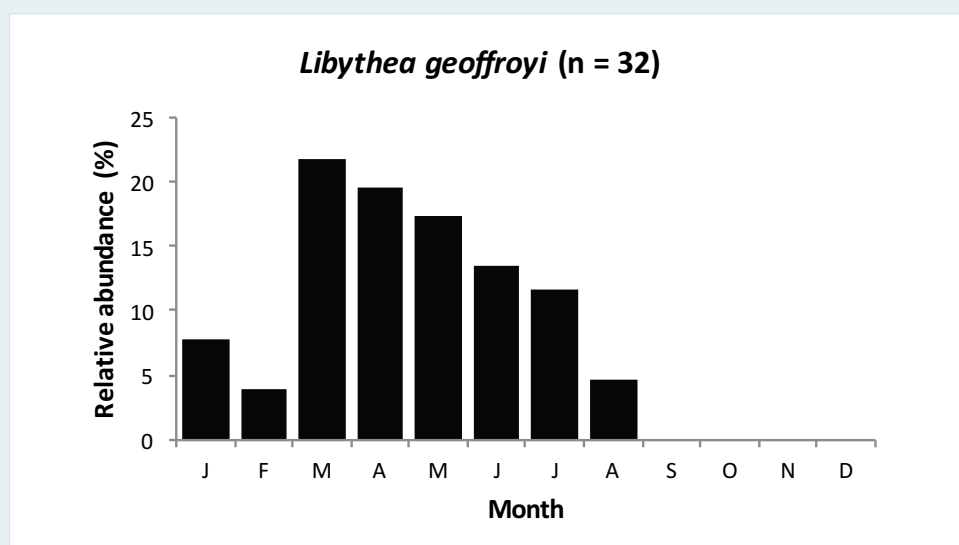
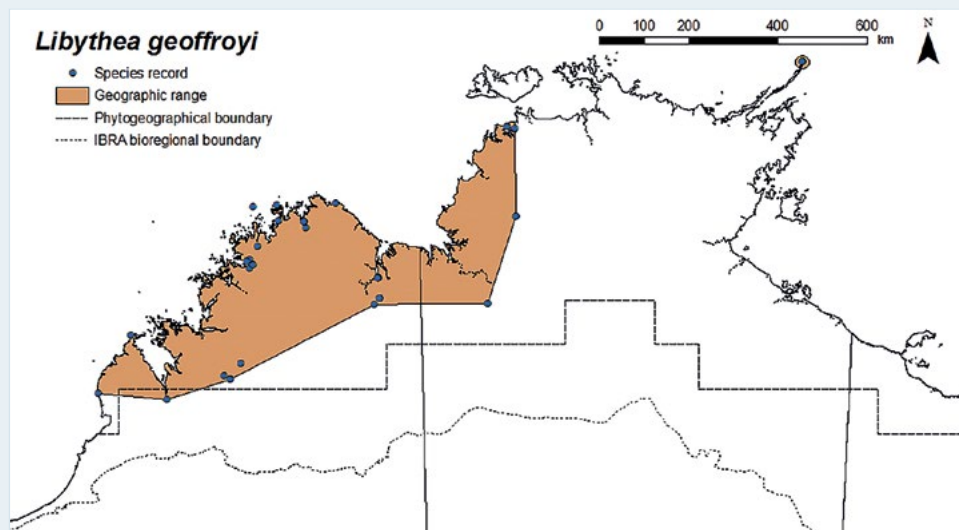
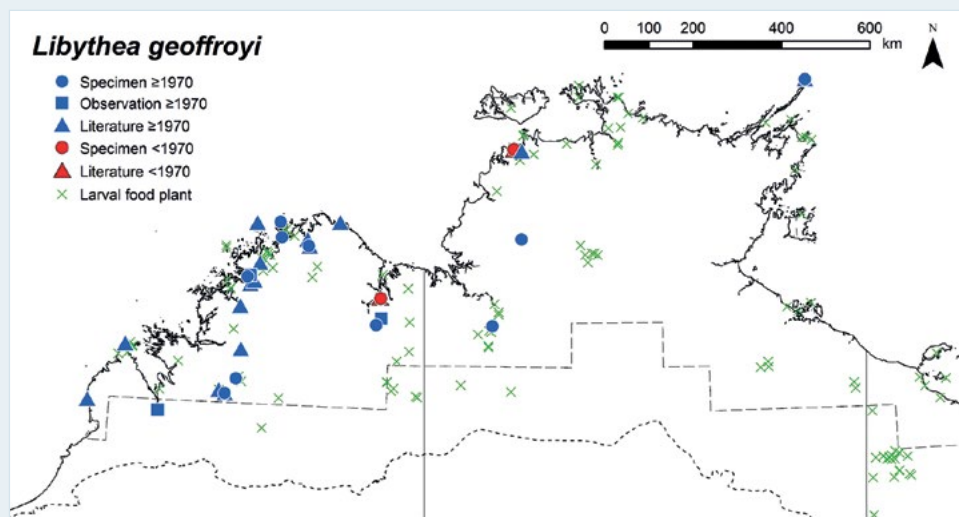
This species is resident in the study region.

Conservation status

LC. The subspecies *L. geoffroyi genia* in the Northern Territory has a restricted range, with two locations occurring in conservation reserves: Fish River and Judbarra/Gregory National Park. Some areas within the overall range may be impacted by inappropriate fire regimes, particularly an increase in the frequency and severity of dry season burns. The habitat is highly susceptible to fire and the larval food plant is intolerant of, or sensitive to, fire.



Photo: Limestone Gorge, Judbarra/Gregory National Park, NT, M.F. Braby

[illegible][illegible]

Blue Tiger

Tirumala hamata (W. S. Macleay, 1826)



Plate 80 Daintree, Qld
Photo: Roger Farrow



Plate 81 Fogg Dam, NT
Photo: M. F. Braby

Distribution

This species occurs in the Kimberley, Top End and western Gulf Country of the study region. It occurs mainly in the higher rainfall areas (> 900 mm mean annual rainfall), but it has been recorded from drier inland areas (700–800 mm), where it reaches its southernmost limits at Koolan Island in Yampi Sound (McKenzie et al. 1995), Kununurra (Koch 1957), WA; Limmen National Park (Butterfly Springs), NT (Franklin 2007); and Doomadgee, Qld (Puccetti 1991). Its geographic range corresponds well with the spatial distribution of its larval food plants, although the plants extend considerably further inland. Outside the study region, *T. hamata* occurs from South-East Asia, through mainland New Guinea and adjacent islands and eastern Australia to the Solomon Islands, Fiji, Tonga and Samoa.

Habitat

Tirumala hamata breeds in both wet and dry monsoon forests, including evergreen monsoon vine forest and semi-deciduous monsoon vine thicket, where the larval food plants grow as vines (Forster and Martin 1990; Braby 2015e).

Larval food plants

Cynanchum carnosum, *Marsdenia glandulifera*, *M. velutina*, *Secamone elliptica* (Apocynaceae). The main larval food plant appears to be *S. elliptica* (Forster and Martin 1990), but larvae have also been found and reared on *M. glandulifera* (Braby 2015e), *M. velutina* and *C. carnosum* (Forster and Martin 1990).

Seasonality

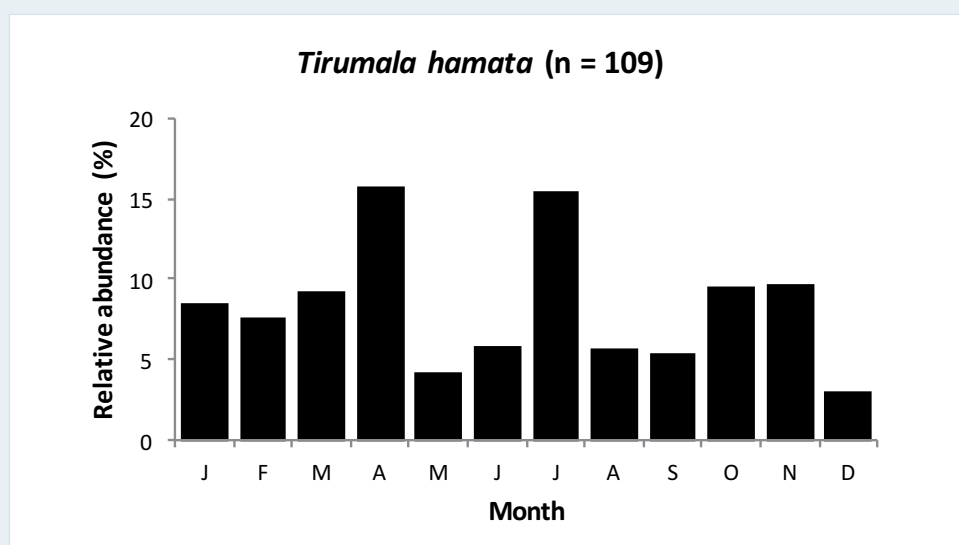
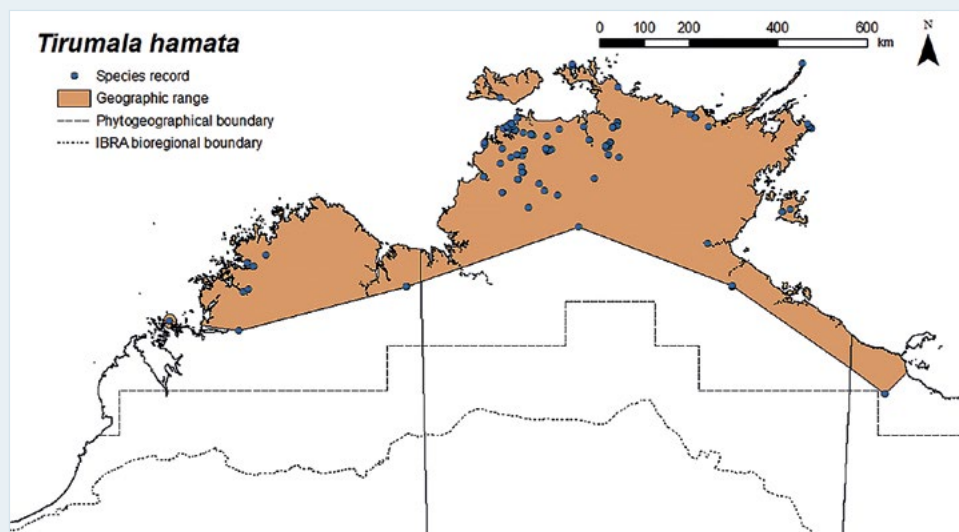
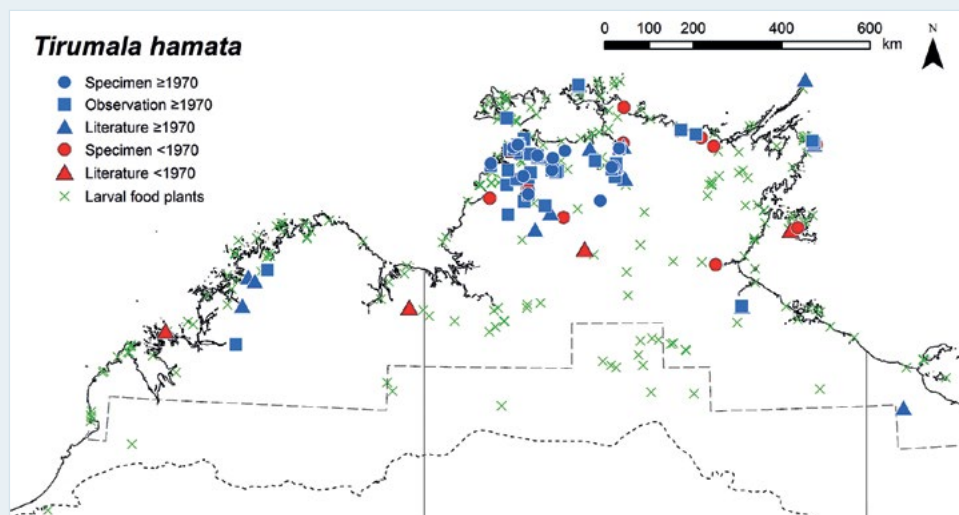
Adults occur throughout the year and they do not appear to show any pronounced seasonal changes in abundance. They are generally observed in comparatively low numbers, do not migrate and do not form large overwintering aggregations, unlike the populations in north-eastern Queensland (see Monteith 1982; Scheermeyer 1993, 1999). The breeding phenology is not well understood for northern Australia, but the following observations suggest the breeding season is limited to a short period during the wet season. At Fogg Dam, NT, the immature stages were recorded during the 'build-up' (October and November) of high moisture and high temperatures, when the larval food plant (*Marsdenia glandulifera*) was producing new soft leaves on which the eggs were laid and larvae were feeding (Braby 2015e). Near Darwin, NT, Forster and Martin (1990: 131) noted that on *M. velutina* 'eggs are laid only on the fresh young leaves which are available only in the wet season'. During the dry season, adults have been recorded overwintering in relatively small numbers with *Euploea* spp. in moist refuges, mainly confined to areas of deep shade, in the Prince Regent Nature Reserve in the western Kimberley, WA (Bailey and Richards 1975). Presumably, the species stops breeding during the long dry season, similar to populations in northern Queensland (Scheermeyer 1993).

Breeding status

This species is resident in the study region.

Conservation status

LC.

[illegible]

Plain Tiger

Danaus chrysippus (Linnaeus, 1758)



Plate 82 Wanguri, Darwin, NT
Photo: M. F. Braby



Plate 83 Wanguri, Darwin, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *D. chrysippus cratippus* (C. Felder, 1860). It is restricted to the northern coastal areas of the Top End, where it has been recorded from several sites on Cobourg Peninsula (Black Point, 2 km east–north-east of Black Point and Smith Point) (Braby 2014a; Braby et al. 2015) and in Darwin (Braby 2015c), NT. Outside the study region, *D. chrysippus* occurs widely in Africa, India and South-East Asia.

Habitat

The breeding habitat of *D. chrysippus* has not been confirmed, but most adults have been collected in coastal paperbark swampland bordering freshwater lagoons where the putative larval food plant (*Cynanchum carnosum*) grows as a vine in high density (Braby 2014a). In addition, a freshly emerged female was collected from this habitat and an empty pupal shell (possibly this species) was found within a metre of the female; another female was observed flying close to the ground searching the putative food plant but did not oviposit. Also, males have been observed to establish mate-location behaviour by perching close to the ground on reeds and dead branches for short periods.

Larval food plants

Not recorded in the study region; possibly *Cynanchum carnosum* (Apocynaceae) (Braby 2014a).

Seasonality

The seasonal abundance and breeding phenology of this species are not well understood. Adults are seasonal, occurring only during the wet season (January–April). Most specimens have been collected in February and March, but there are too few records (n = 10) to assess seasonal changes in abundance.

Breeding status

Danaus chrysippus does not appear to have become permanently established in the study region. It is most likely a vagrant or a rare immigrant from South-East Asia, occasionally colonising the region and breeding temporarily during favourable conditions (Braby et al. 2015).

Conservation status

NA.

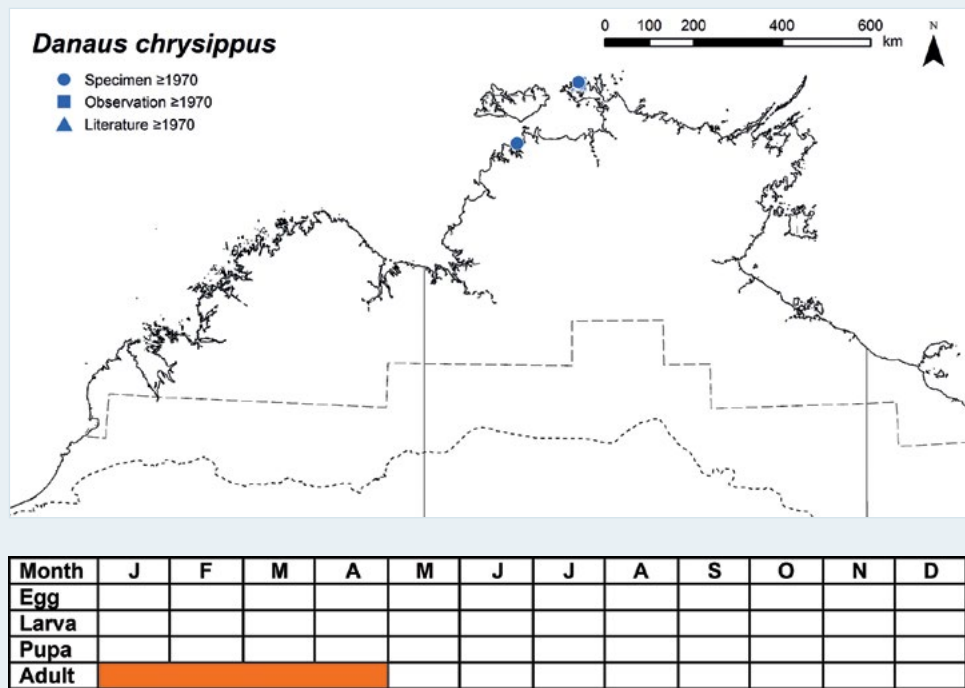


Photo: Black Point, Cobourg Peninsula, NT, M.F. Braby

Lesser Wanderer

Danaus petilia (Stoll, 1790)



Plate 84 Holmes Jungle, Darwin, NT
Photo: Tissa Ratnayake



Plate 85 Katherine, NT
Photo: M. F. Braby

Distribution

This species occurs almost throughout the entire study region. It extends from moist coastal areas to drier inland areas of the semi-arid zone, as well as in the arid zone of central Australia beyond the southern boundary of the study region. The spatial distribution of the known native larval food plants is similarly widespread, although they are less well represented in the semi-arid and arid zones, indicating that several other (as yet unreported) food plants are probably used in these areas in addition to the introduced larval food plant (*Calotropis procera*). Outside the study region, *D. petilia* occurs in mainland New Guinea, throughout Australia and the islands of the South Pacific.

Habitat

Danaus petilia occurs in a wide variety of habitats, but it breeds mainly in savannah woodland and paperbark woodland where the larval food plants grow as evergreen or seasonal perennial vines.

Larval food plants

Brachystelma glabriflorum, *Cynanchum carnosum*, *C. christineae*, *C. leibianum*, *C. pedunculatum*, *Oxystelma esculentum*, *Tylophora flexuosa* (Apocynaceae); also **Calotropis procera* (Apocynaceae); possibly *Cynanchum floribundum*, *Marsdenia australis* and *Rhyncharrhena linearis* (Apocynaceae), which are food plants in the arid areas of South Australia and Queensland (Braby 2000).

Seasonality

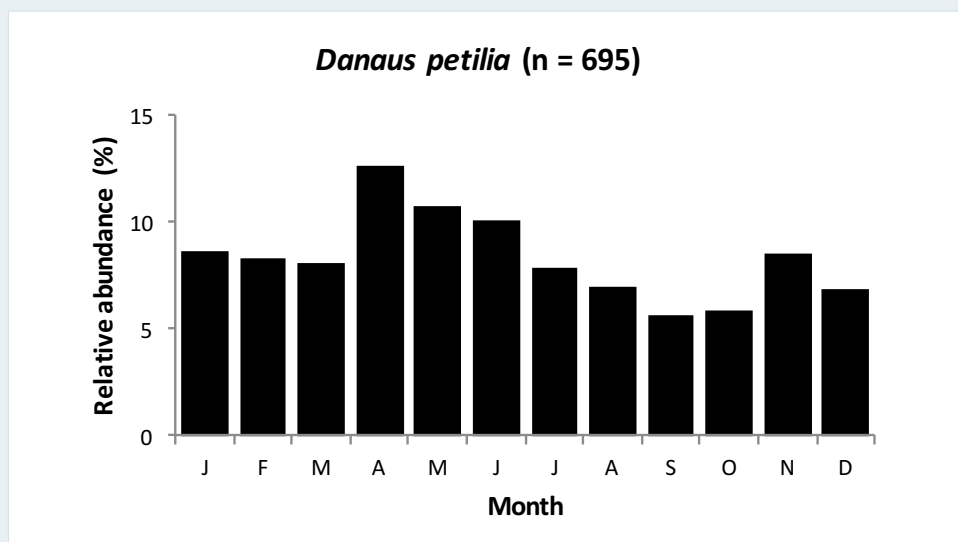
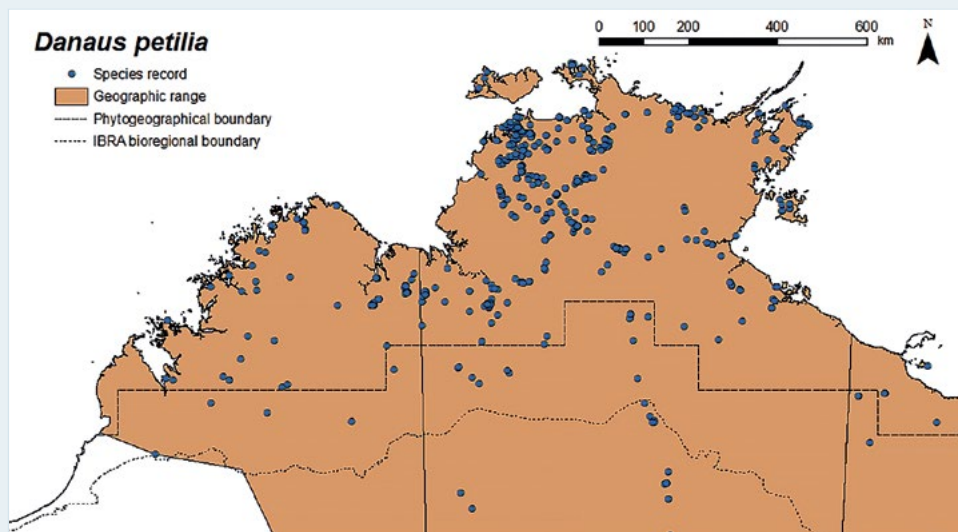
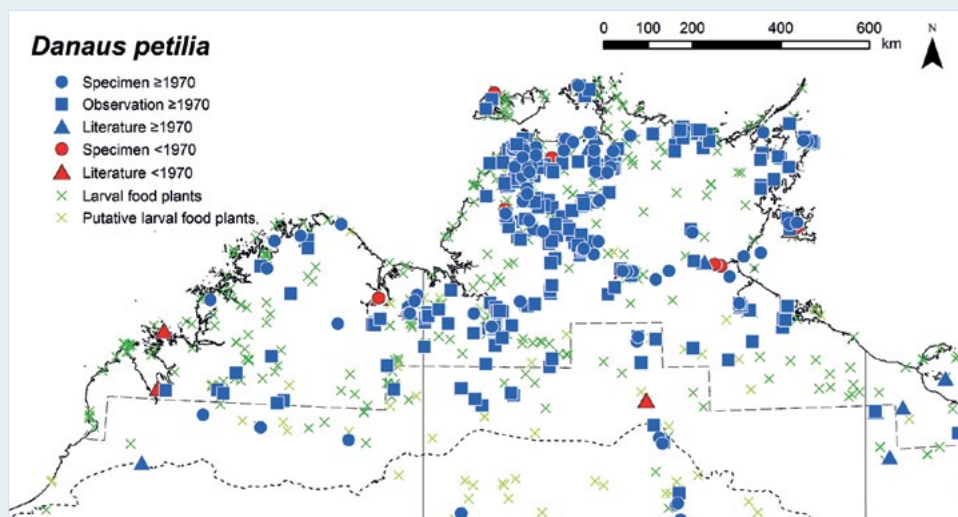
Adults occur throughout the year, but are generally more abundant towards the end of the wet season (April) and least abundant in the late dry season (September and October). The immature stages are found mainly during the wet season (November–April), when the larval food plants produce new shoots and buds (Forster 1991), but breeding may continue until at least the mid dry season (July). However, it is not clear whether breeding is seasonal and most females stop breeding during the late dry season or breeding continues but reproductive activity declines as the dry season progresses. Although it is a well-known migrant (Smithers 1983a), we have no records of migratory flights in the study region.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Orange Tiger

Danaus genutia (Cramer, [1779])



Plate 86 Elsey National Park, Mataranka, NT
Photo: M. F. Braby



Plate 87 Elsey National Park, Mataranka, NT
Photo: M. F. Braby

Distribution

This species is represented by the subspecies *D. genutia alexis* (Waterhouse & Lyell, 1914), which is endemic to the study region. *Danaus genutia* does not occur elsewhere in Australia. It has a restricted and possibly disjunct distribution, occurring mainly in the eastern Kimberley and the north-western corner of the Top End. There is also a historical record from Derby in the western Kimberley, WA (Waterhouse and Lyell 1914), and an isolated population at Mataranka, NT, which is associated with the upper headwaters of the Roper River (McCubbin 1971; Le Souëf 1971). The geographic range broadly corresponds with the spatial distribution of the larval food plant, which likewise is restricted in extent; however, this plant is absent from Mataranka, indicating that an alternative (as yet unreported) food plant is used at this location. Outside the study region, *D. genutia* occurs widely in India, southern China and South-East Asia, although it is absent from Maluku.

Habitat

Danaus genutia breeds mainly in upper estuarine swamps supporting dense stands of the reed *Typha* sp. on which the larval food plant grows as a vine (Meyer 1995). At Mataranka (Elsey National Park), adults occur in paperbark swampland along the edge of inland perennial freshwater streams and they no doubt breed in this habitat. Small numbers of adults have also been recorded in other habitats in the Top End, but these are thought to be individuals dispersing from nearby breeding areas.

Larval food plant

Oxystelma esculentum (Apocynaceae).

Seasonality

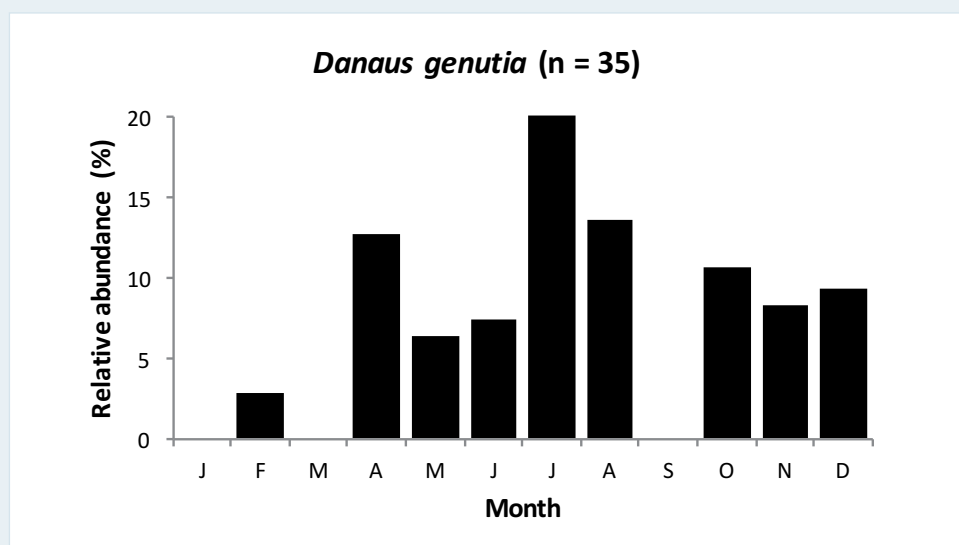
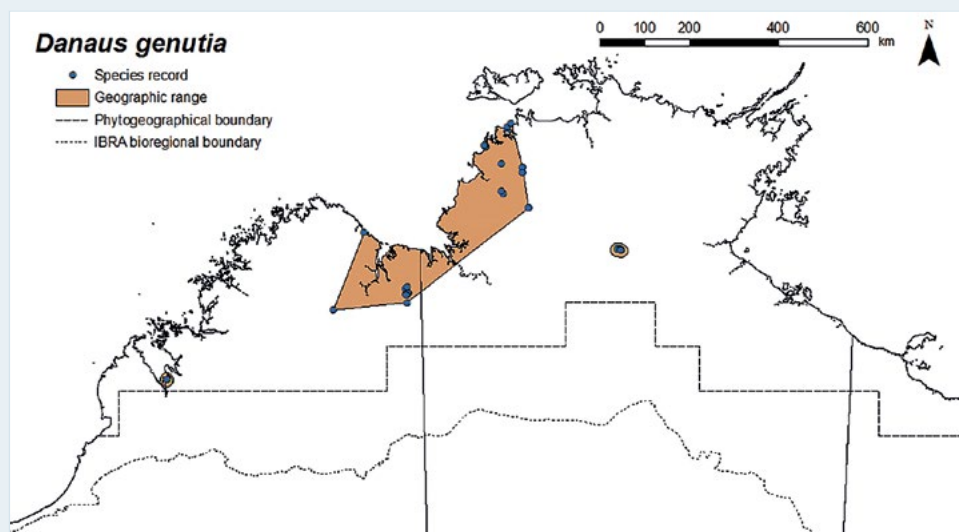
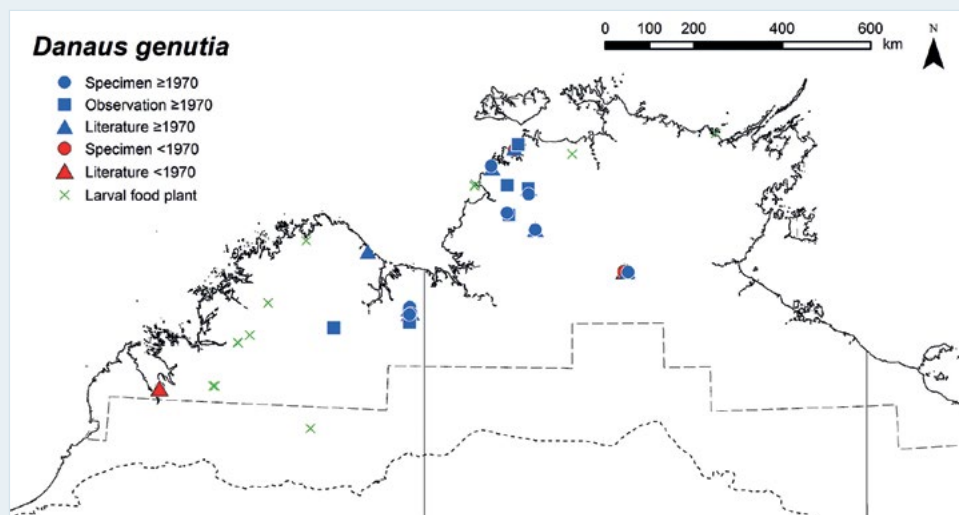
The seasonal abundance and breeding phenology of this species are not well understood. Adults have been recorded sporadically during the year; they have been noted to be abundant during the mid dry season (July) (McCubbin 1971) and late dry season (October) (Field 1990b), as well as in the wet season (December and April) (Meyer 1995). Our data suggest a peak in abundance in July. Presumably, adults occur throughout the year; the paucity of records during the wet season (January–March) is probably related to the fact that the breeding habitats are frequently inaccessible at that time of year. However, it remains to be determined whether they breed seasonally or continuously throughout the year.

Breeding status

This species is resident in the study region.

Conservation status

LC. Despite the wide geographical range of the subspecies *D. genutia alexis*, available data suggest it has a disjunct distribution with a restricted AOO. The larval food plant is currently listed as DD under the *TPWCA*. Further field data are needed on the ecological requirements of this species, particularly its critical habitat and larval food plants in noncoastal areas of range.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Swamp Tiger

Danaus affinis (Fabricius, 1775)



Plate 88 Holmes Jungle, Darwin, NT
Photo: Tissa Ratnayake



Plate 89 Buffalo Creek, Leanyer Swamp, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *D. affinis affinis* (Fabricius, 1775). It occurs from the Kimberley, through the Top End to coastal and near-coastal areas in the western Gulf Country, generally in areas that receive more than 800 mm mean annual rainfall. The larval food plants are more widely distributed, particularly *Marsdenia viridiflora*, which extends further south into the semi-arid zone, but it is considered unlikely that *D. affinis* is established in these areas. Outside the study region, *D. affinis* occurs sporadically from South-East Asia, through mainland New Guinea and adjacent islands and eastern Australia to the Solomon Islands, Vanuatu and New Caledonia.

Habitat

Danaus affinis breeds mainly in paperbark swampland and paperbark woodland adjacent to swamps in coastal areas, often associated with estuarine creeks and rivers, where its primary larval food plant (*Cynanchum carnosum*) grows as a vine. However, in the more inland areas, it breeds in eucalypt open forest where alternative food plants grow (Braby 2015e), as well as paperbark swamps adjacent to perennial freshwater rivers where *C. carnosum* grows.

Larval food plants

Cynanchum carnosum, *Marsdenia viridiflora*, *Sarcobus hullsii* (Apocynaceae). The main food plant is *C. carnosum*.

Seasonality

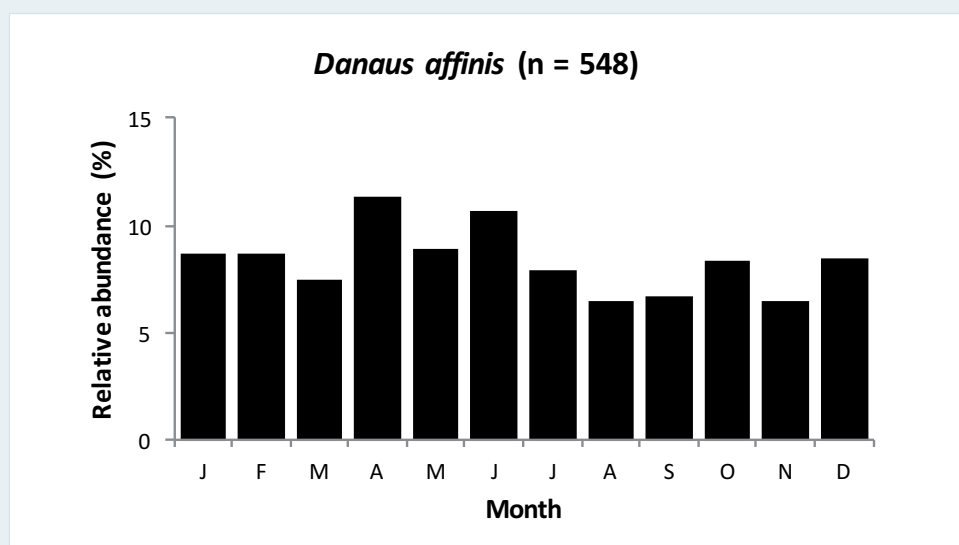
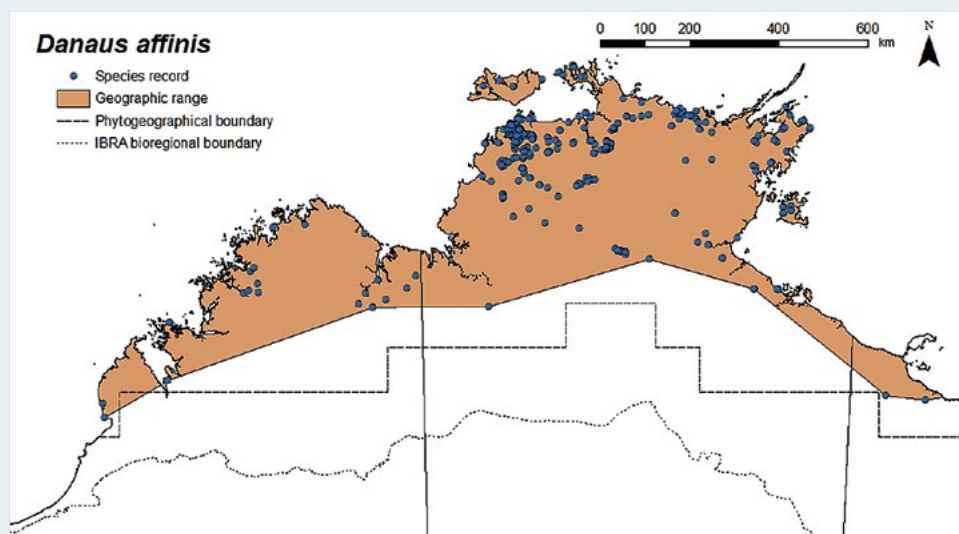
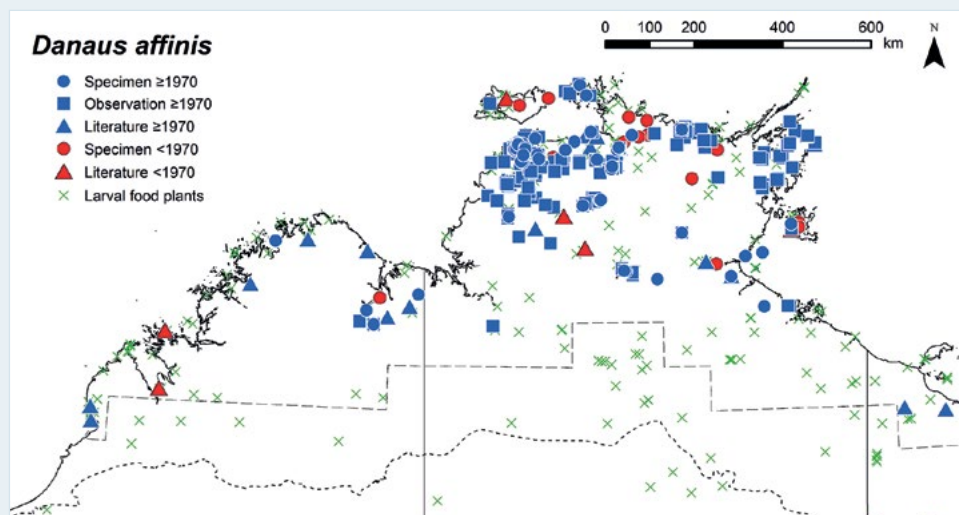
Adults occur throughout the year and show little seasonal variation in abundance, although they are generally more abundant in the early dry season (April–June), when they may be exceedingly common. The immature stages, like *Danaus petilia*, have only been recorded during the wet season (November–April), during which several generations are completed. However, it is not clear whether breeding is seasonal and most females stop breeding and remain in reproductive diapause during the dry season or breeding continues but reproductive activity declines as the dry season progresses.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg		Yellow										
Larva		Green									Green	
Pupa		Blue										
Adult	Orange											

Monarch

Danaus plexippus (Linnaeus, 1758)



Plate 90

Photo: Eleanor P. Williams

Distribution

This species has been recorded sporadically from the study region, including Kununurra, WA (Dunn 1980); near Darwin, Kakadu National Park (South Alligator River) and 50 km south–south-east of Elliott, NT; and from several locations in the western Gulf Country (Braby 2014a). Most of the records for the Northern Territory and Queensland were made when a large-scale migration occurred during April–May 2013 (Braby 2014a). It has also been recorded 40 km north–north-east of Burke & Wills Roadhouse, Qld, on the eastern boundary of the study region (Dunn 2015a). More recently, a female specimen in worn condition flying in a northerly direction was netted at Humpty Doo, NT, on 26 November 2016 (K. McLachlan). Two earlier records from near Darwin (Holmes Jungle Conservation Park, 5 March 2013; Gunn Point, 30 November 2013) previously thought to be deliberate introductions (see Braby 2014a) are tentatively accepted as natural occurrences; the record for Holmes Jungle may have been part of the north-west migration observed two months later, in May 2013. The putative larval food plant (*Asclepias curassavica*) is cultivated in and near Darwin, NT. Outside the study region, *D. plexippus* occurs widely in eastern and southern Australia. It is native to the New World, but became established in Australia in the 1870s.

Excluded data

A record from Darwin, NT (Bullocky Point, 2 September 2009), is an artificial introduction based on a wedding butterfly release (Braby 2014a) and is therefore excluded. An observation made at Kununurra, WA, by Dunn (1980) was considered doubtful by Braby (2012b) because at that time the species was not known elsewhere in the study region and it may have been confused with the similar looking *Danaus genutia*, which occurs commonly at the location. However, K. L. Dunn (pers. comm.) advises that the specimen was observed at close proximity, enabling it to be readily distinguished by its large size and characteristic wing pattern.

Habitat

The breeding habitat of *D. plexippus* has not been recorded in the study region.

Larval food plants

Not recorded in the study region; possibly *Asclepias curassavica* (Apocynaceae) and other introduced and naturalised species of milkweeds, which are the food plants in Queensland (Braby 2000).

Seasonality

The seasonal abundance and breeding phenology of this species are not well understood. Adults have been recorded sporadically during the year, but there are too few records ($n = 13$) to assess any seasonal changes in abundance.

Breeding status

Danaus plexippus does not appear to have become permanently established in the study region. It is most likely a vagrant or infrequent visitor, entering the region occasionally during migration, but it remains to be determined whether it colonises and breeds temporarily.

Conservation status

NA.

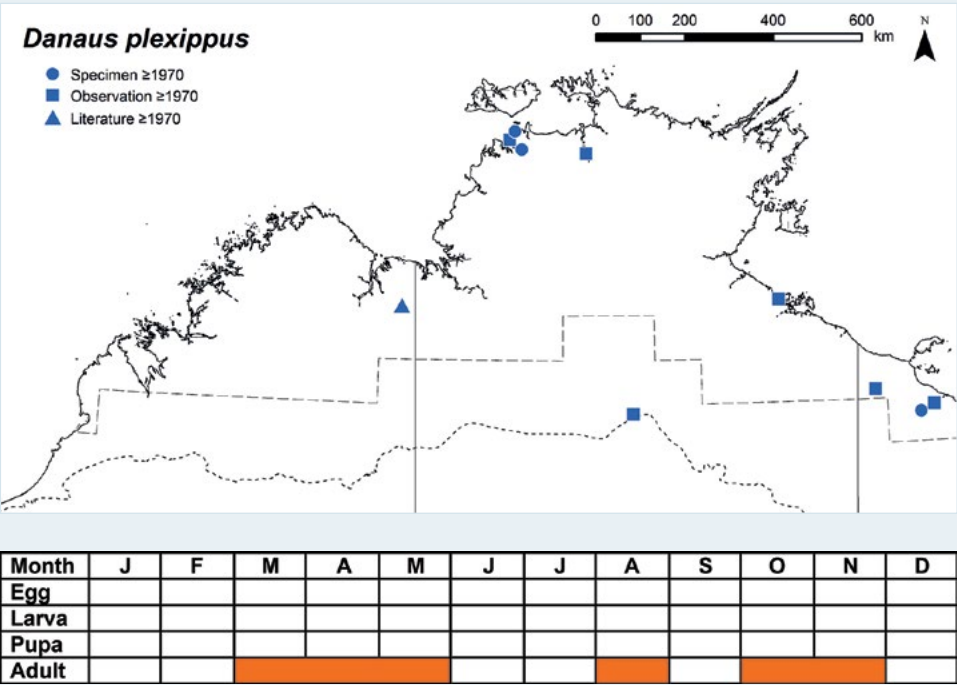


Photo: Nourlangie Rock, Kakadu National Park, NT, M.F. Braby

Two-brand Crow

Euploea sylvester (Fabricius, 1793)



Plate 91 Maningrida, NT
Photo: Deb Bisa

Distribution

This species is represented by the subspecies *E. sylvester pelor* Doubleday, 1847, which is endemic to the study region. It has a broad distribution, occurring in the Kimberley, Top End and western Gulf Country. It extends from moist coastal areas to lower rainfall areas of the semi-arid zone (c. 700 mm mean annual rainfall), reaching its southernmost limit at Bessie Spring, NT (Dunn and Dunn 1991). The geographic range corresponds well with the spatial distribution of its primary larval food plant (*Marsdenia geminata*), although the plant extends further inland. However, the record from Boodjamulla/Lawn Hill National Park (Murray Spring), Qld (Daniels and Edwards 1998), appears to lie outside the known range of the food plant, suggesting it may have been a vagrant that dispersed beyond the normal breeding range. Outside the study region, *E. sylvester* occurs widely from India, southern China and South-East Asia, through mainland New Guinea and adjacent islands and north-eastern Australia to Vanuatu and New Caledonia.

The subspecies *E. sylvester sylvester* (Fabricius, 1793) occurs in the Gulf of Carpentaria at Walker Creek 36 km east of Karumba, Qld, just outside the eastern boundary of the study region (Braby 2015d), and further surveys are required to determine whether it extends further west.

Habitat

Euploea sylvester breeds in semi-deciduous monsoon vine thicket and riparian evergreen monsoon vine forest along the banks of rivers where the larval food plants grow as vines (Meyer 1997a).

Larval food plants

Marsdenia geminata, *Parsonsia alboflavescens* (Apocynaceae). The main food plant is *M. geminata* (Meyer 1997a), but they occasionally use *P. alboflavescens* on Gove Peninsula, NT (Braby 2011a).

Seasonality

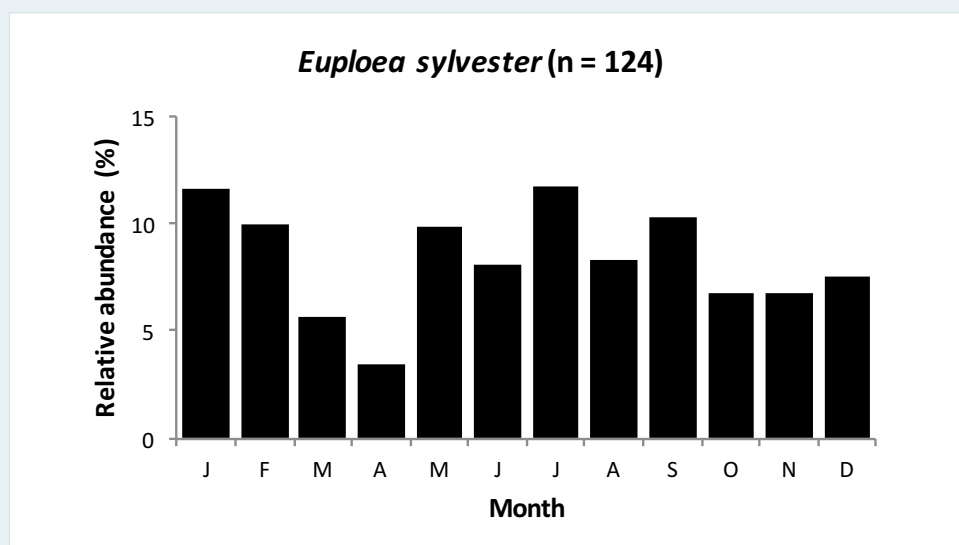
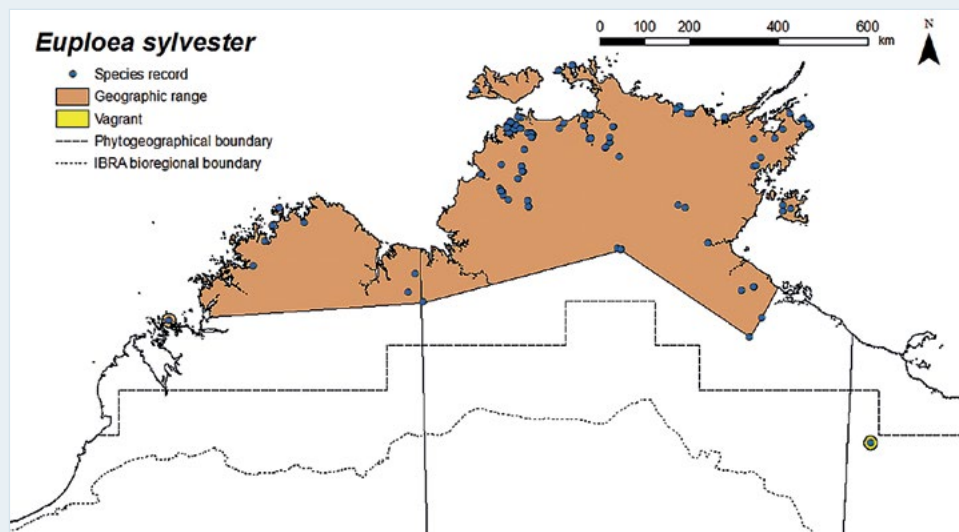
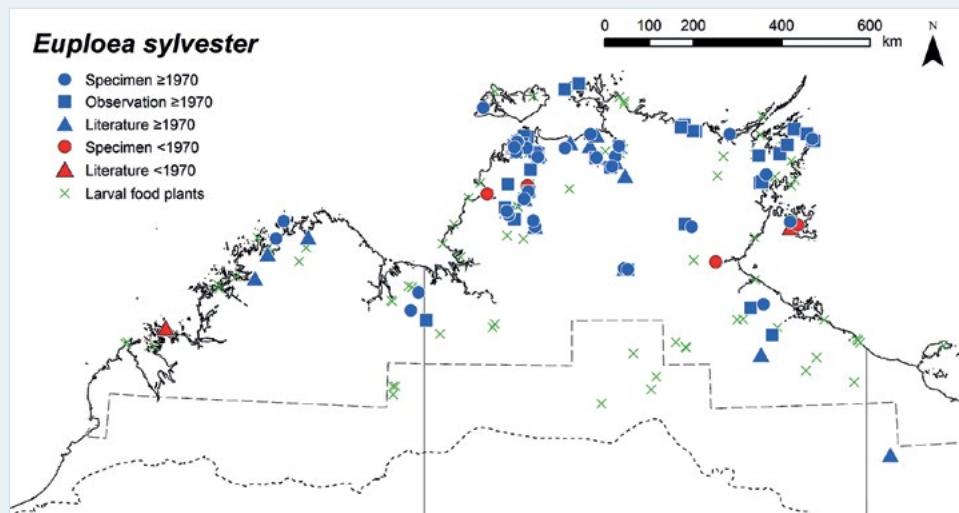
Adults occur throughout the year. They appear to show little seasonal variation in abundance, although at Darwin, NT, Meyer (1997a) noted that adults were most numerous during the late wet season (late February and March). Breeding is seasonal, limited mainly to the wet season (December–January or April, depending on location), although on one occasion the immature stages were found in July on Gove Peninsula, where the wet season is protracted. During the dry season, females generally stop breeding and aggregate in small numbers in moist refuges, such as the deep shade within pockets of monsoon forest (Monteith 1982; Scheermeyer 1993).

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Small Brown Crow

Euploea darchia W. S. Macleay, 1826



Plate 92 Beatrice Hill, NT
Photo: M. F. Braby

Distribution

This species is represented by the subspecies *E. darchia darchia* W. S. Macleay, 1826, which is endemic to the study region. It has a disjunct distribution, occurring in the northern Kimberley and Top End, where it is restricted to the higher rainfall areas (> 1,000 mm mean annual rainfall, but generally > 1,200 mm). Its geographic range closely corresponds with the spatial distribution of its larval food plant. The food plant, however, extends slightly further south, with occurrences in eastern Walcott Inlet in the western Kimberley, WA, and Groote Eylandt and Maria Island in Limmen Bight, NT. Further field surveys are therefore required to determine whether *E. darchia* occurs in these areas. Outside the study region, *E. darchia* occurs in Timor, Banda, the Kai Islands and north-eastern Australia.

Habitat

Euploea darchia breeds in coastal semi-deciduous monsoon vine thicket and riparian evergreen monsoon vine forest along the banks of rivers where the larval food plant grows as a vine (Meyer 1996d).

Larval food plant

Trophis scandens (Moraceae).

Seasonality

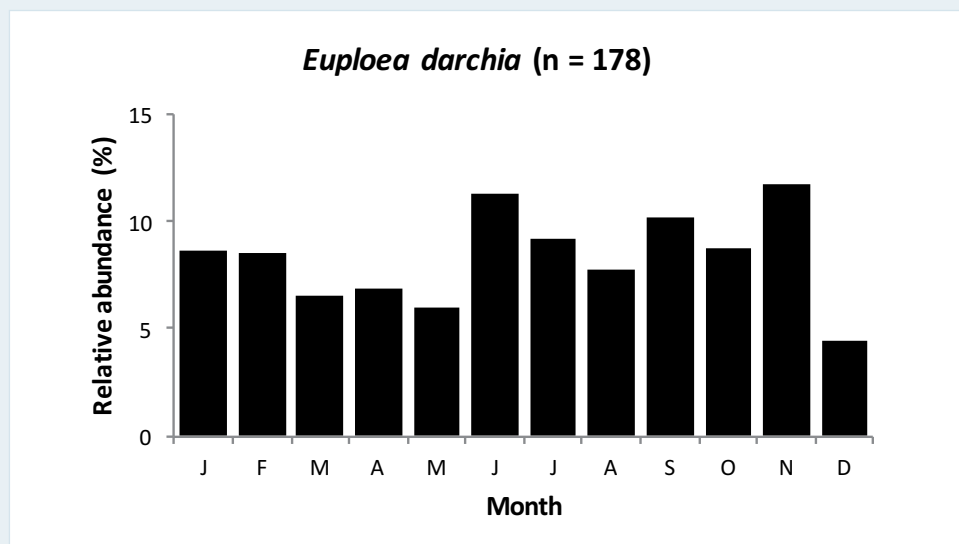
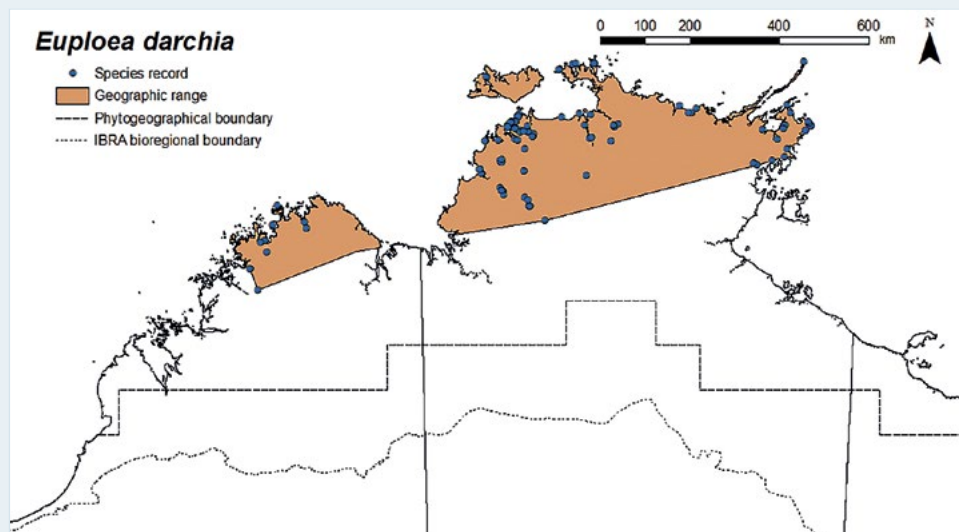
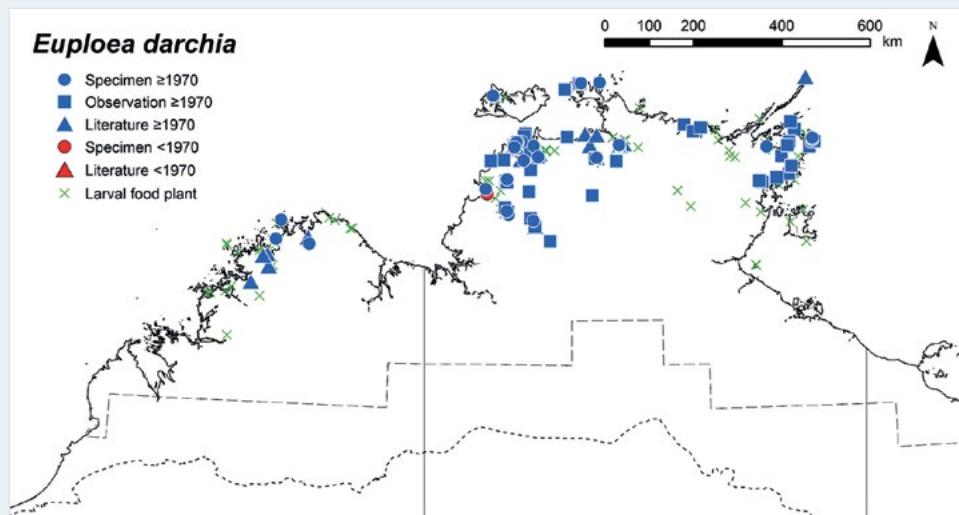
Adults occur throughout the year, but their patterns of seasonal changes in abundance are not entirely clear. Near Darwin, NT, Meyer (1996d, and pers. comm.) noted that adults were freshly emerged and more abundant from February to May, and Franklin (2011) similarly found the species to be more abundant during the mid wet season and early dry season (January–May) based on quantitative studies conducted over 14 months during 2008–09. Our data suggest it is more abundant during the mid dry season and early wet season (June–November), but this may be due to biased sampling at that time of year when adults tend to aggregate in moist refuges, such as the deep shade in pockets of monsoon forest. Breeding, as for *Euploea sylvestri*, is strictly seasonal and limited to the wet season (January–April).

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Common Crow

Euploea corinna (W. S. Macleay, 1826)



Plate 93 Palmerston, NT
Photo: Andrea Hope

Distribution

This species has a very wide distribution, occurring throughout much of the study region. It extends from moist coastal areas to drier inland areas of the semi-arid zone, as well as the arid zone of central Australia beyond the southern boundary of the study region. It has been recorded as far south as Brunchilly Station 95 km north–north-east of Tennant Creek, NT. The broad geographic range corresponds well with the spatial distribution of its larval food plants. Outside the study region, *E. corinna* occurs in Cocos (Keeling) and Christmas islands, the Lesser Sunda Islands, central, north-eastern and eastern Australia and Lord Howe and Norfolk islands.

Habitat

Euploea corinna breeds in a wide variety of habitats, including paperbark swampland, savannah woodland, open sandstone pavement and the edges of mixed riparian woodland and evergreen monsoon vine forest along creeks and riverbanks where the larval food plants usually grow as vines or sometimes as tall shrubs, as well as in suburban parks and gardens.

Larval food plants

Gymnanthera oblonga, *Ichnocarpus frutescens*, *Marsdenia geminata*, *M. viridiflora*, *Parsonsia alboflavescens*, *Sarcolobus hullsii*, *Sarcostemma viminalis*, *Secamone elliptica* (Apocynaceae), *Ficus virens* (Moraceae); also **Adenium obesum* (Apocynaceae). The larvae feed on many food plants, but they are most frequently found on *G. oblonga*.

Seasonality

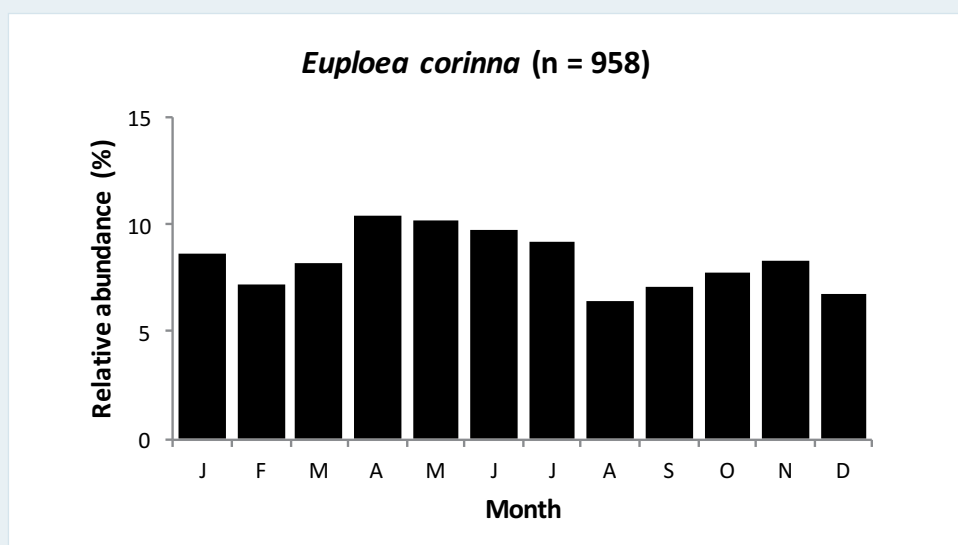
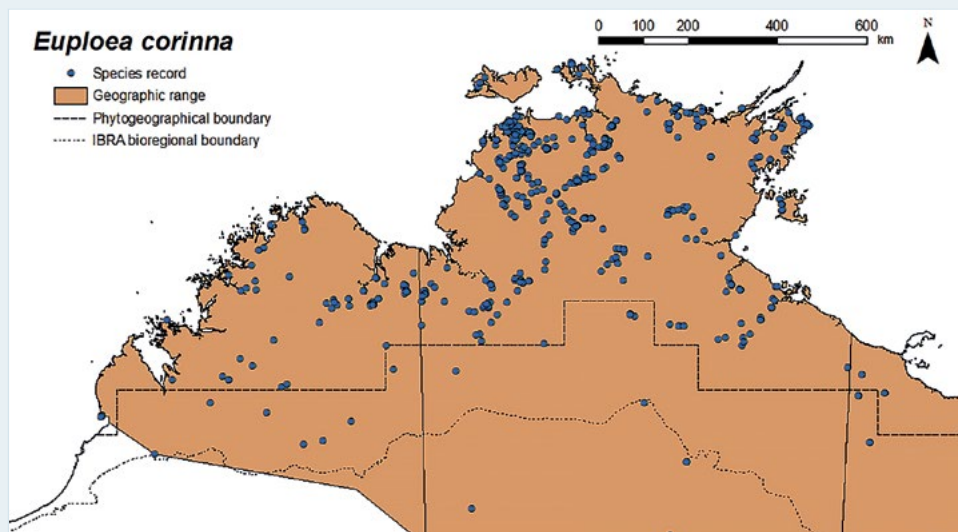
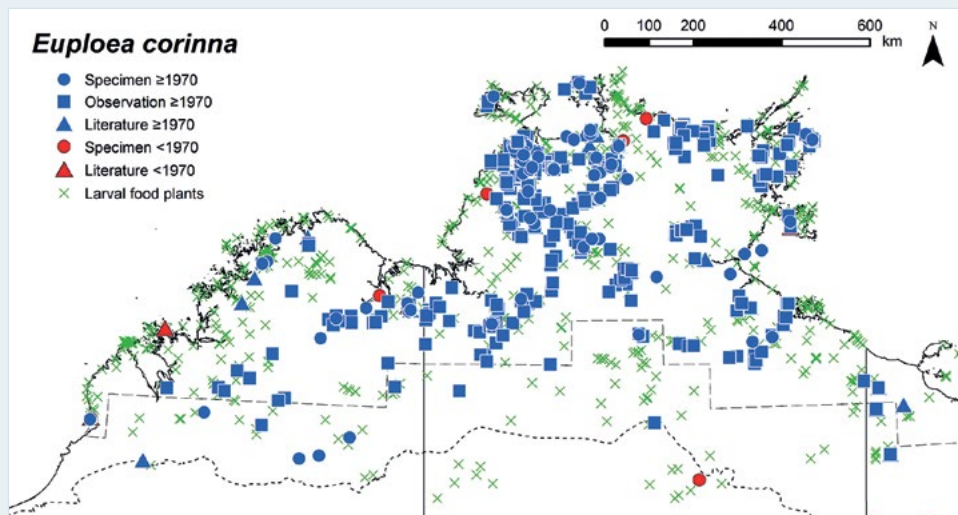
Adults occur throughout the year but show little seasonal variation in abundance, although they tend to be more abundant during the late wet season and early dry season (April–June). During the dry season (April–August), they aggregate in moist refuges—typically pockets of monsoon forest in sheltered gorges or as gallery forest along water courses, where they may be observed in immense numbers clustered on tree foliage, the trunks and roots of fig trees and sheltered rock faces, especially in the more inland areas (Le Souëf 1971; Bailey and Richards 1975; Monteith 1982). During the dry season aggregations, most females do not breed; however, the immature stages may be found throughout the year, indicating that some females continue to breed depending on local conditions—similar to that reported in Queensland (Scheermeyer 1993).

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

No-brand Crow, Gove Crow

Euploea alcatheae (Godart, [1819])



Plate 94 Gapuwiyak, Gove Peninsula, NT
Photo: M. F. Braby

Distribution

This species is represented by the subspecies *E. alcatheae enastri* Fenner, 1991, which is endemic to the study region. It occurs in the Top End, its presence in the region detected only as recently as 1988 (Fenner 1991). It is restricted to Gove Peninsula, NT, where it occurs in lowland coastal or near-coastal areas. Its geographic range closely corresponds with the spatial distribution of its primary larval food plant (*Parsonsia alboflavescens*). This plant extends slightly further west to the Goyder River in Arnhem Land, but field surveys carried out at this location and nearby areas (Koolatong River) did not detect *E. alcatheae* (Braby 2010a). Outside the study region, *E. alcatheae* occurs from Maluku, the Kai and Aru islands, through mainland New Guinea to the D'Entrecasteaux Islands and the Torres Strait Islands, Qld (Lambkin et al. 2017).

Habitat

Euploea alcatheae breeds in mixed paperbark tall open forest with rainforest elements in the understorey, usually in juxtaposition with evergreen monsoon vine forest, and in the edges of evergreen monsoon vine forest where the larval food plants grow as vines. Both breeding habitats are associated with perennial groundwater seepages or springs, usually along drainage lines or floodplains (Braby 2009, 2010a). The critical breeding habitats are subject to natural disturbance by both fire and flood, and occasionally cyclonic events.

Larval food plants

Gymnanthera oblonga, *Marsdenia glandulifera*, *Parsonsia alboflavescens* (Apocynaceae). The main food plant is *P. alboflavescens* (Braby 2009), but occasionally other species are used, including *G. oblonga*, *M. glandulifera* (Braby 2009) and possibly *Tylophora benthamii* (Fenner 1991).

Seasonality

Adults have been recorded during most months of the year, but their patterns of seasonal changes in abundance are not well understood. Adults have been recorded more frequently during the dry season (June–October), but this is due to a sampling bias because very little fieldwork has been conducted during the wet season, when the breeding habitats are largely inaccessible. Similarly, the immature stages have been recorded mainly during the dry season (June–October), as well as in the late wet season (March and April). Presumably, the species breeds continuously throughout the year and several generations are completed annually (Braby 2009).

Breeding status

This species is resident in the study region.

Conservation status

Near Threatened (NT). The subspecies *E. alcatheae enastri* is a short-range endemic (EOO = 9,100 sq km), with much of its range occurring within the Dhimurru and Laynhapuy IPAs. Braby (2010a) concluded there was no evidence of decline, but it was conservation-dependant in that management was required to mitigate threats from habitat modification through inappropriate fire regimes and disturbance by feral animals (buffalo and pig), while maintaining some level of natural disturbance. Moreover, the larval food plant is currently listed as NT under the *TPWCA*. Without management, the taxon may qualify for a threatened category in the near future because the population of *E. alcatheae enastri* is likely to be reduced based on a projected decline in the AOO and/or quality of its habitat (criterion A3c). Monitoring of the extent and/or quality of the critical habitat and occupancy of the butterfly is required for this species.

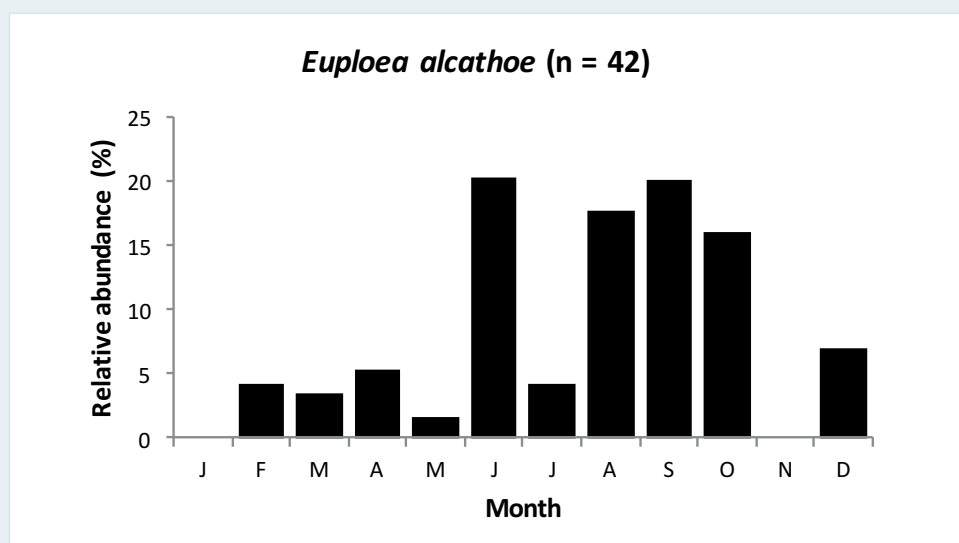
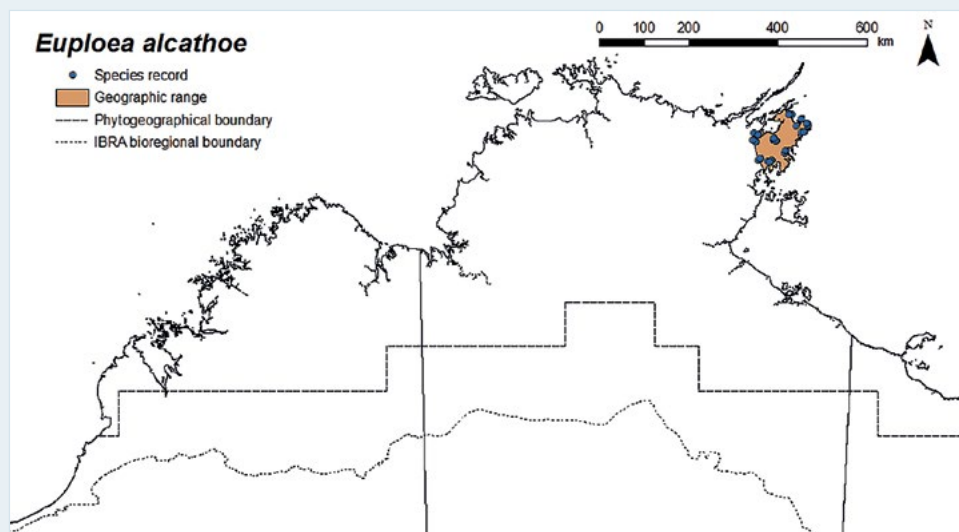
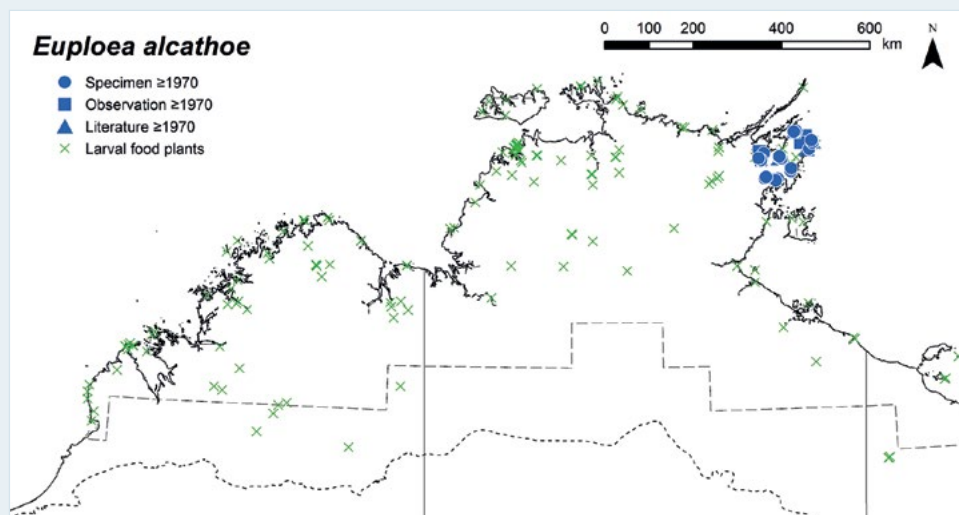
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Photo: Robin Falls, NT, M.F. Braby

Orange Lacewing

Cethosia penthesilea (Cramer, 1777)



Plate 96 Fish River Station, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *C. penthesilea paksha* Fruhstorfer, 1905. *Cethosia penthesilea* does not occur elsewhere in Australia. It is restricted to the Top End, where it occurs in the higher rainfall areas (> 800 mm mean annual rainfall, but mostly > 1,000 mm). Its southernmost limits are Katherine (Charles Darwin University) and Ngukurr (Normand 2009), NT, which are slightly drier areas. The geographic range closely follows the spatial distribution of its larval food plant in the Northern Territory. Although the food plant extends to the Kimberley, *C. penthesilea* is absent from this area. Outside the study region, *C. penthesilea* occurs in Java and the Lesser Sunda Islands, including Timor and its nearby islands.

Habitat

Cethosia penthesilea breeds in semi-deciduous monsoon vine thicket and the edges of evergreen monsoon vine forest in both coastal and inland areas where the larval food plant grows as a large, woody perennial deciduous vine on a variety of rocky substrates (Hall 1981).

Larval food plant

Adenia heterophylla (Passifloraceae).

Seasonality

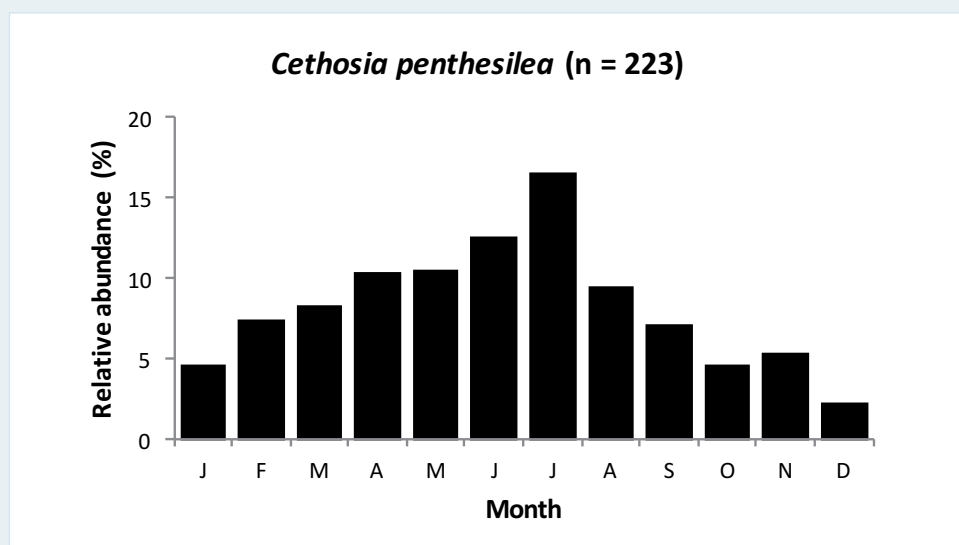
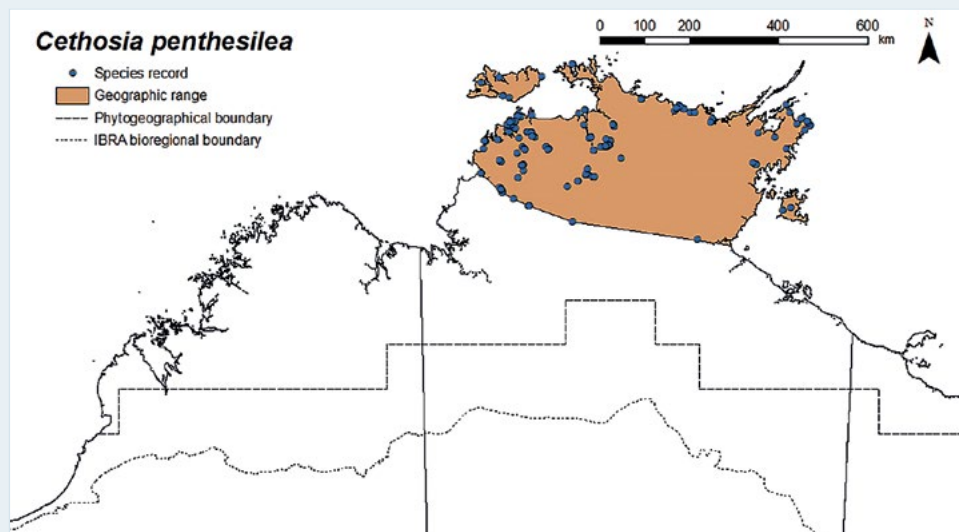
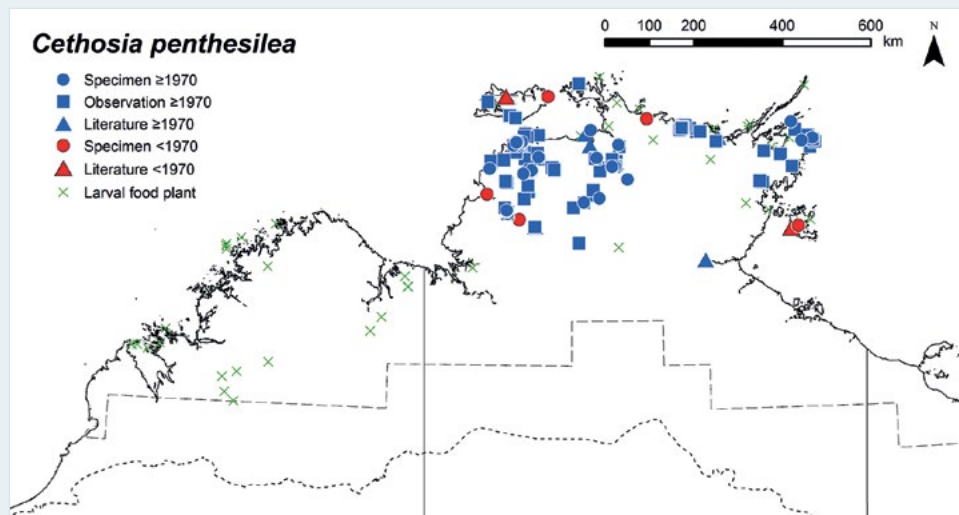
Adults occur throughout the year, but they are most abundant from the late wet season to the mid dry season (April–August), with a peak in abundance in July. However, in some years or locations they may be very numerous during the mid wet season (January and February). Their numbers decline rapidly as the dry season progresses and very few adults are present during the late dry season and early wet season. Hall (1981) also noted that adults occur throughout the year, but are usually more common during the first half of the dry season (April–July). The immature stages have been recorded sporadically from the early wet season to the mid dry season (November–June). The larvae feed and develop rapidly on the new soft leaf growth and several generations are completed annually, but it is not clear how *C. penthesilea* survives the late dry season (August–October), when the foliage of the food plant is frequently absent. Presumably, the species remains in pupal diapause during the late dry season.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Glasswing

Acraea andromacha (Fabricius, 1775)



Plate 97 Wongalara Wildlife Sanctuary, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *A. andromacha andromacha* (Fabricius, 1775). It occurs very widely throughout the region, extending from moist coastal areas to drier inland areas of the semi-arid zone (< 500 mm mean annual rainfall), where it has been recorded as far south as the Edgar Ranges (Common 1981) and Halls Creek (Koch 1957), WA; Three Ways Roadhouse, NT (Dunn and Dunn 1991); and Boodjamulla/Lawn Hill National Park, Qld (Daniels and Edwards 1998; Franklin 2007; Dunn 2015a). It also extends into the arid zone of central Australia beyond the southern boundary of the study region. The geographic range corresponds well with the spatial distribution of its larval food plants. Outside the study region, *A. andromacha* occurs from the Lesser Sunda Islands, through mainland New Guinea and the northern half of Australia to the Solomon Islands, New Caledonia, Fiji and Samoa.

Habitat

Acraea andromacha breeds in a variety of habitats, including savannah woodland and disturbed open woodland where the larval food plants (*Hybanthus* spp.) grow as seasonal perennial herbs, and coastal semi-deciduous monsoon vine thicket and riparian evergreen monsoon vine forest along perennial streams within gorges where the alternative food plant (*Adenia heterophylla*) grows as a large climbing vine. Males also congregate on hilltops to locate females, but they do not breed in these habitats.

Larval food plants

Adenia heterophylla (Passifloraceae), *Hybanthus aurantiacus*, *H. enneaspermus* (Violaceae); also **Passiflora foetida* (Passifloraceae).

Seasonality

Adults occur throughout the year, but they are most abundant during the mid dry season (May–July). Their numbers diminish as the dry season progresses, and they are very scarce at the start of the wet season. The immature stages (eggs or larvae) have been recorded sporadically from the early wet season to the mid dry season (November–July), and are not known to undergo diapause. Several generations are completed annually, but it is not clear how the species survives the late dry season (August–October), when the foliage of the larval food plants is frequently absent or reduced in quality. Presumably, populations contract to moister areas, such as along the margins of riverbanks and perennial creeks, where breeding may continue.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Tawny Coster

Acraea terpsicore (Linnaeus, 1758)



Plate 98 Wagait Beach, Cox Peninsula, NT
Photo: M. F. Braby



Plate 99 Wagait Beach, Cox Peninsula, NT
Photo: M. F. Braby

Distribution

This species occurs widely in the Kimberley and Top End of the study region and extends to the Northern Deserts. The geographic range of *A. terpsicore* has been expanding rapidly since it was first detected near Darwin, NT, in April 2012 (Braby et al. 2014a, 2014b). It has been recorded as far south as Broome, WA (G. Swann); Elliott (R. P. Weir) and Camfield Station at the northern edge of the Tanami Desert (J. Archibald), NT; and has recently been detected in the Gulf Country of western Cape York Peninsula (Kowanyama district), Qld (Wilson 2016), just outside the eastern boundary of the study region. Spatial modelling predicts that its range will eventually occupy the entire monsoon tropics of northern Australia, from moist coastal areas to drier inland areas of the semi-arid zone (c. 500 mm mean annual rainfall), which also coincides with the spatial distribution of its primary larval food plant (Braby et al. 2014a). Outside the study region, *A. terpsicore* occurs naturally in India and Sri Lanka, but it has now colonised Indochina, the Malay Peninsula, Borneo and the Greater and Lesser Sunda islands.

Habitat

Acraea terpsicore breeds mainly in savannah woodland and grassland, favouring modified or disturbed open areas, such as suburban roadsides, where the native larval food plant grows as a seasonal perennial herb (Braby et al. 2014b). Males also congregate on hilltops to locate females, but they do not breed in these habitats.

Larval food plants

Hybanthus enneaspermus (Violaceae); also **Passiflora foetida* (Passifloraceae). The main food plant is *H. enneaspermus*, but occasionally the larvae feed on introduced *P. foetida* (Braby et al. 2014b). In captivity, the larvae readily feed and develop successfully on *Adenia heterophylla*, but to date they are not known to use this plant in the field.

Seasonality

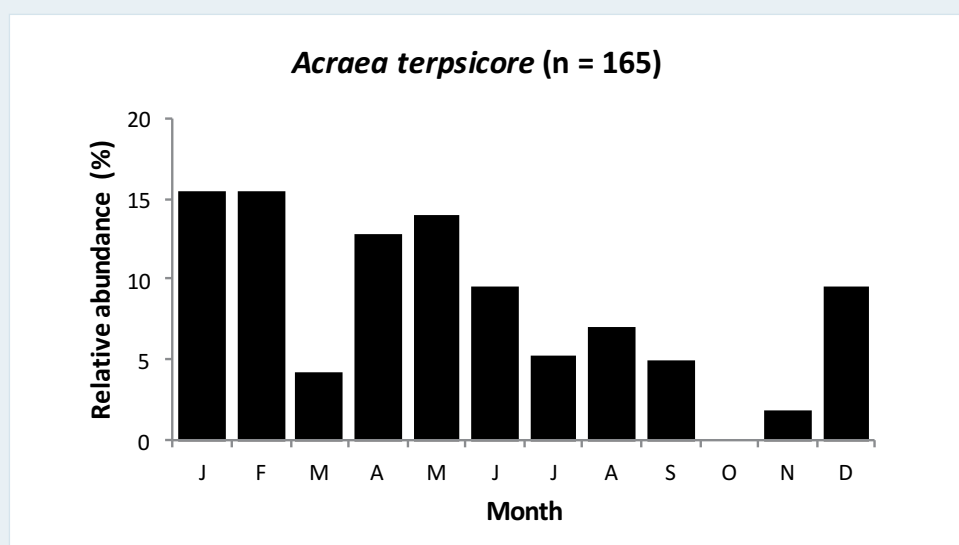
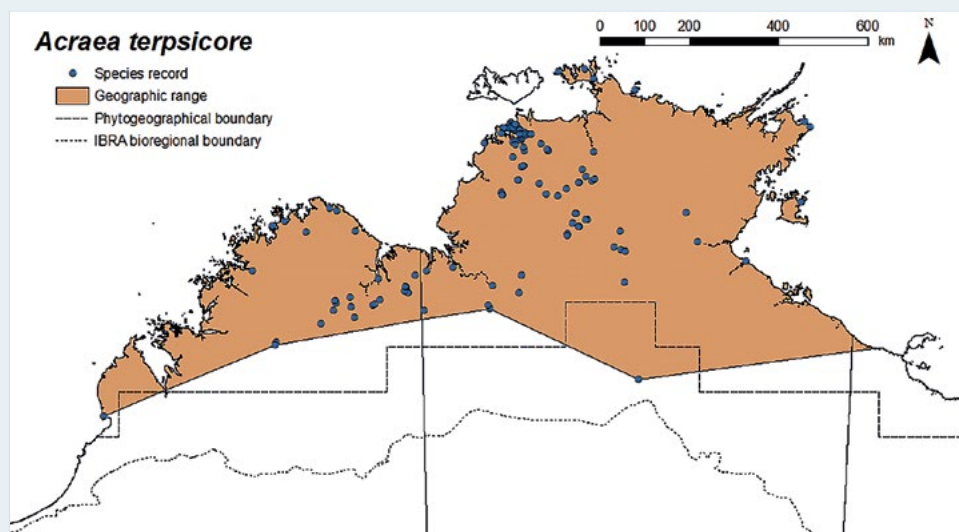
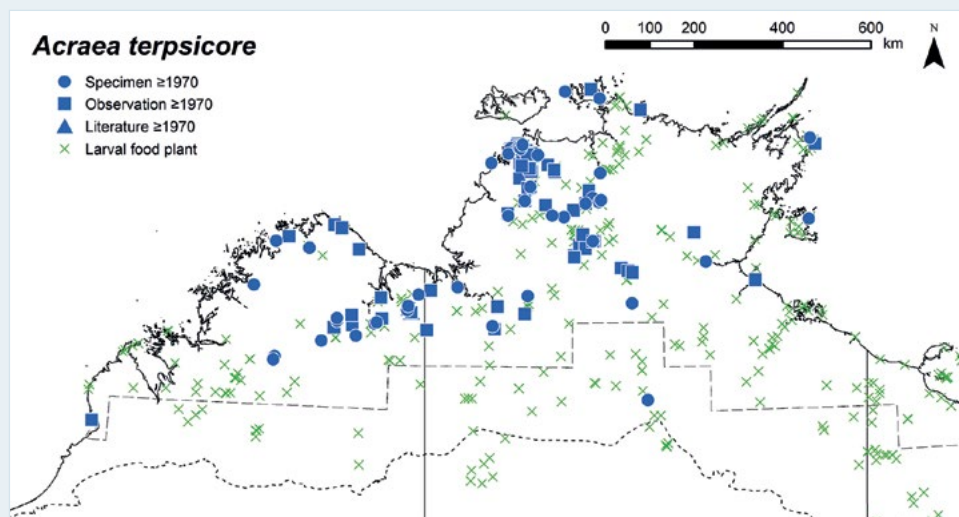
Adults occur during most months of year, but they are most abundant during the wet season and early dry season (January–May). They become scarce as the dry season progresses (June–November) and are apparently absent in October. The immature stages have been recorded sporadically from the early wet season to the mid dry season (December–August), and are not known to undergo diapause. Several generations are completed annually, but it is not clear how the species survives the late dry season (September–November) when the foliage of both the native and the introduced larval food plants is frequently absent or reduced in quality. Presumably, populations contract to moister areas, such as along the margins of swamps and riverbanks, where breeding may continue.

Breeding status

Although *A. terpsicore* is resident in the study region, it has recently colonised the area (within the past six years) and its range is currently expanding outside the region in northern Queensland (Wilson 2016; Field 2017; Franklin et al. 2017).

Conservation status

NA.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Spotted Rustic

Phalanta phalantha (Drury, [1773])



Plate 100 Manton Dam, NT
Photo: Deb Bisa



Plate 101 Fish River Station, NT
Photo: M. F. Braby

Distribution

This species is represented by the subspecies *P. phalantha araca* (Waterhouse & Lyell, 1914), which is endemic to the study region. *Phalanta phalantha* does not occur elsewhere in Australia. It occurs in the north of the Northern Territory, where it is restricted to the higher rainfall areas (> 900 mm mean annual rainfall) of the north-western corner of the Top End. It reaches its southern limit at Flora River Nature Park and its easternmost limit at Kakadu National Park (Mt Brockman) (Kikkawa and Monteith 1980), NT. The geographical range broadly corresponds with the spatial distribution of its native larval food plant. The food plant, however, extends further east along the northern coast to Gove Peninsula; thus, further field surveys are required to determine whether *P. phalantha* occurs in north-eastern Arnhem Land. The isolated record from further south, at Daly Waters, NT, based on two specimens collected in January 1973 (A. Allwood and T. Weir), either constitutes vagrant specimens outside the normal breeding range or indicates that a temporary population became established on one of the introduced larval food plants cultivated in suburban gardens. Outside the study region, *P. phalantha* occurs widely in Africa, Madagascar, India, Japan and South-East Asia.

Habitat

Phalanta phalantha breeds mainly in semi-deciduous monsoon vine thicket where the native larval food plant grows as a semi-deciduous shrub. It also breeds in riparian woodland with rainforest elements in the understorey and the edges of evergreen monsoon vine forest along the banks of perennial streams, as well as in suburban parks and gardens.

Larval food plants

Flacourtia territorialis (Salicaceae); also **Flacourtia inermis*, **F. rukam* (Salicaceae).

Seasonality

Adults occur throughout the year, but they are most abundant during the wet season and early dry season (November–July), with an apparent peak in abundance in April. Hutchinson (1978) recalls observing large numbers of adults—in excess of 100—during May on the Daly River, NT. They are very scarce and often absent during the late dry season (August–October) and in some years they may be absent during the ‘build-up’ (November and December). The immature stages have been recorded sporadically from the early wet season to the early dry season (November–June). The larvae feed and develop rapidly on the new soft leaf growth and several generations are completed annually, but it is not clear how the species survives the late dry season (August–October) when the foliage of the native larval food plant is frequently absent or reduced in quality. Presumably, the species remains in pupal diapause during the late dry season.

Breeding status

This species is resident in the study region.

Conservation status

LC. Although the subspecies *P. phalantha araca* has a restricted range, there are no known threats facing the taxon.

Blue Argus

Junonia orithya (Linnaeus, 1758)



Plate 104 Kingfisher Camp, north of Lawn Hill, Qld
Photo: Don Franklin



Plate 105 Mt Burrell, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *J. orithya albicincta* Butler, 1875. It occurs widely throughout much of the region, from moist coastal areas to drier inland areas of the semi-arid zone (< 500 mm mean annual rainfall), where it has been recorded as far south as 24 km south-west of Halls Creek, WA; Powell Creek Outstation near Renner Springs, NT; and Thornton, north-east of Camooweal, Qld (Franklin 2007). It has also been recorded from McLaren Creek, NT, just outside the southern boundary of the study region. The geographic range falls within the spatial distribution of the larval food plants, although the food plants extend much further inland. Outside the study region, *J. orithya* occurs widely from Africa, India, southern China and South-East Asia, through mainland New Guinea and adjacent islands to north-eastern and eastern Australia.

Habitat

Junonia orithya breeds mainly in savannah woodland and open woodland where the larval food plants (*Buchnera* spp.) grow as annual herbs (Braby 2011a, 2015e), but it may also breed along the edges of monsoon forest where alternative food plants (*Thunbergia arnhemica*, *Pseuderanthemum variabile*) grow.

Larval food plants

Pseuderanthemum variabile, *Thunbergia arnhemica* (Acanthaceae), *Buchnera asperata*, *B. gracilis*, *B. linearis* (Orobanchaceae); also **Asystasia gangetica* (Acanthaceae).

Seasonality

Adults occur throughout the year, but, like *Junonia villida*, they are most abundant during the late wet season and early dry season (April and May). Their numbers steadily diminish as the dry season progresses. The immature stages have been recorded sporadically during the wet season and early dry season (November–May). It is not clear whether the species continues to breed during the dry season, but a female has been observed in late August ovipositing on the food plant growing in moist sand near permanent water at Kakadu National Park (Maguk Plunge Pool). Presumably, most females stop breeding and remain in reproductive diapause during the late dry season, similar to populations in northern Queensland (Jones 1987).

Breeding status

This species is resident in the study region.

Conservation status

LC.

Meadow Argus

Junonia villida (Fabricius, 1787)



Plate 106 Kakadu National Park, NT
Photo: Don Franklin



Plate 107 Berry Springs, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *J. villida villida* (Fabricius, 1787). It occurs throughout the entire study region, extending well into the semi-arid zone, as well as into arid areas of central Australia south of the study region. Outside the study region, *J. villida* occurs in Christmas and Cocos (Keeling) islands, mainland New Guinea and adjacent islands, throughout Australia, Lord Howe and Norfolk islands, New Zealand and the islands of the South Pacific.

Habitat

Junonia villida occurs in a variety of habitats, but breeds mainly in savannah woodland and open woodland.

Larval food plants

Not recorded in the study region; probably *Hygrophila angustifolia* (Acanthaceae) and *Evolvulus alsinoides* (Convolvulaceae), as well as a wide variety of introduced herbaceous species, which are the food plants in eastern Australia (Braby 2000).

Seasonality

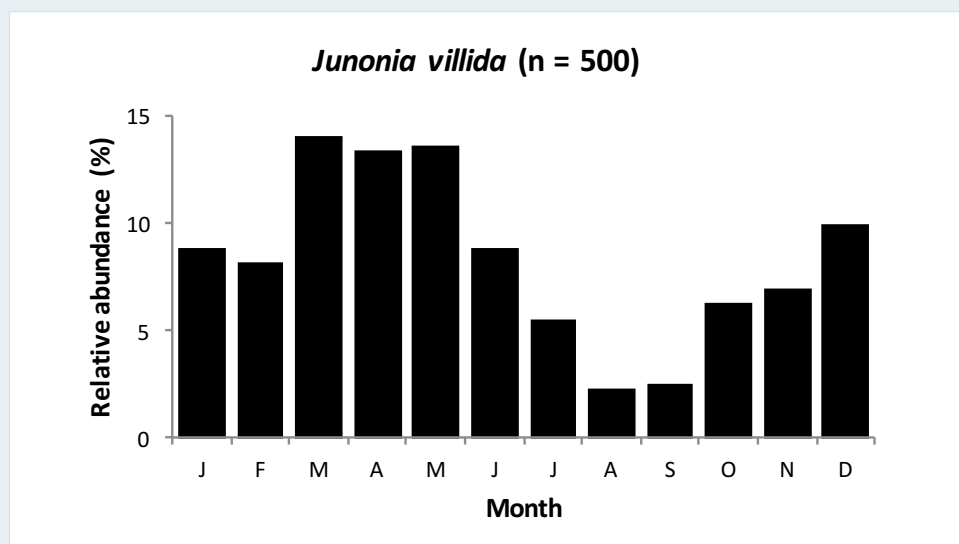
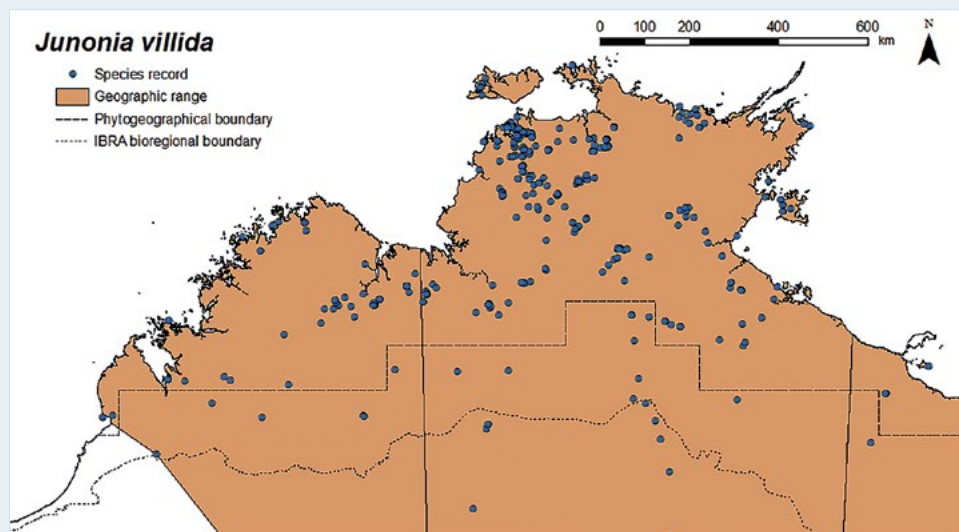
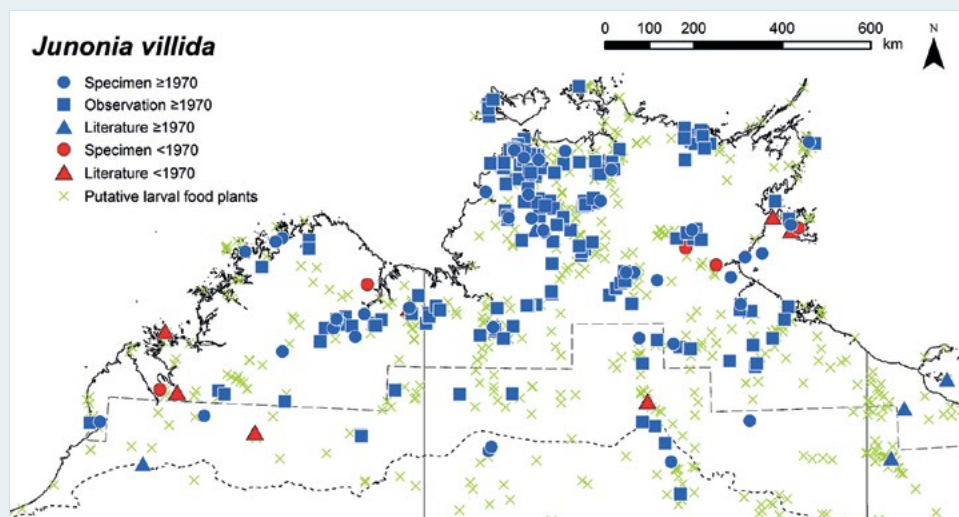
Adults occur throughout the year, but, like *Junonia orithya*, they are most abundant during the late wet season and early dry season (March–May). Their numbers steadily diminish as the dry season progresses, and they are scarce or even absent in some locations during the late dry season (August and September). Franklin (2011) observed similar trends near Darwin, NT, based on quantitative studies conducted over 14 months during 2008–09, although adults peaked slightly earlier in the wet season. Surprisingly, we have few data on the breeding phenology and seasonal history of the immature stages of this common and widespread species. Larvae have been recorded in January and May, but the identity of the plants was not determined due to the tendency of final instar larvae to wander from their food plants. Presumably, the species breeds during the wet season and early dry season and most females stop breeding and remain in reproductive diapause during the late dry season, similar to populations in northern Queensland (Jones 1987).

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Chocolate Argus

Junonia hedonia (Linnaeus, 1764)



Plate 108 Wanguri, Darwin, NT
Photo: M. F. Braby

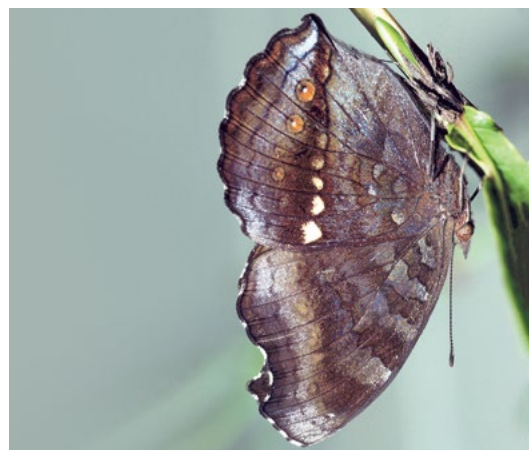


Plate 109 Cardwell, Queensland
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *J. hedonia zelima* (Fabricius, 1775). It occurs in the Kimberley, Top End and western Gulf Country, extending from moist coastal areas to drier inland areas of the semi-arid zone (c. 700 mm mean annual rainfall), where it has been recorded as far south as Adcock Gorge, WA (Franklin et al. 2005); and Wollongorang Station (Settlement Creek), NT (Franklin et al. 2005). Its geographic range corresponds well with the spatial distribution of its larval food plant, although the food plant extends further inland into lower rainfall areas. Its occurrence is more sporadic in the Kimberley and the food plant appears to be underreported in the northern Kimberley. Outside the study region, *J. hedonia* occurs from the Philippines and Indonesia, through mainland New Guinea and adjacent islands and north-eastern and eastern Australia to the Bismarck Archipelago and the Solomon Islands.

Habitat

Junonia hedonia breeds mainly in paperbark swampland in floodplains and mixed paperbark–pandanus swamps adjacent to evergreen monsoon vine forest where the larval food plant grows as an annual herb, sometimes in shallow water (Braby 2011a). It also breeds in riparian paperbark woodland.

Larval food plant

Hygrophila angustifolia (Acanthaceae).

Seasonality

Adults occur throughout the year, but they are most abundant during the late wet season and first half of the dry season (April–July), with a peak in abundance in June. Their numbers steadily diminish as the dry season progresses, and they are scarce during the wet season. We have very few data on the breeding phenology and seasonal history of the immature stages. The immature stages (eggs and larvae) have been recorded towards the end of the wet season and early dry season (March and May), but undoubtedly they occur at other times of the year. The larval food plant germinates during the wet season and is available only during the late wet season and early dry season and then dies off in the mid to late dry season. Presumably, breeding is seasonal and most females stop breeding and remain in reproductive diapause during the late dry season and possibly early wet season. Although not previously known to migrate, migrations in the Top End have been observed on several occasions at the end of the wet season (Braby 2016b). During migration, adults fly rapidly 2–3 m above the ground from late morning to early afternoon in a northerly direction between mid April and early May. In 2012, a series of observations made over 13 days that involved large numbers of adults indicated that migration lasted for approximately two weeks.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Photo: Fish River Station, NT, M.F. Braby

Lurcher

Yoma sabina (Cramer, [1780])



Plate 111 Macassan Beach, Gove Peninsula, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *Y. sabina parva* (Butler, 1876), although Lambkin and Kendall (2016) recently proposed that *Y. sabina parva* is a synonym of *Y. sabina sabina* (Cramer, [1780]). It was first recorded in the region by Common and Waterhouse (1981), who reported it from Groote Eylandt; however, the earliest record we are aware of is the series of specimens in the NTM collected in April 1976 from Nhulunbuy, NT, by A. J. Dartnall. *Yoma sabina* occurs in the Top End, where it is restricted to north-eastern Arnhem Land. It has been recorded from Elcho Island (Gäwa), Gove Peninsula and Groote Eylandt, NT. Its geographic range closely corresponds with the spatial distribution of its larval food plant, which is largely restricted to Gove Peninsula. Although the food plant also occurs further west at Kakadu National Park, *Y. sabina* is not established in this area. However, the food plant is absent from Elcho Island and Groote Eylandt, indicating that either alternative (as yet unreported) food plants are used at these locations or the known food plant is underreported. Outside the study region, *Y. sabina* occurs from South-East Asia, through mainland New Guinea and adjacent islands and north-eastern Australia to the Bismarck Archipelago and the Solomon Islands.

Excluded data

A historical record from Darwin, NT, by Waterhouse and Lyell (1914) is considered to be erroneous (Braby 2014a).

Habitat

Yoma sabina breeds in eucalypt woodland adjacent to mixed paperbark swampland–monsoon forest or the edges of evergreen monsoon vine forest where the larval food plant grows as a seasonal perennial herb in open areas (G. Martin, pers. comm.).

Larval food plant

Dipteracanthus bracteatus (Acanthaceae).

Seasonality

The seasonal abundance and breeding phenology of this species are not well understood. Adults have been recorded during most months of the year, but there are too few records ($n = 23$) to assess any seasonal changes in abundance. Breeding appears to be limited to the wet season, when the food plant is seasonally available (G. Martin). During the dry season, adults retract to moist refuges, such as evergreen monsoon vine forest or mixed paperbark tall swampland with rainforest elements in the understorey, where they remain settled in deep shade within the dry dead leaves of tall clumps of *Pandanus spiralis*. Presumably, females stop breeding and remain in reproductive diapause during the long dry season.

Breeding status

This species is resident in the study region.

Conservation status

LC. The species *Y. sabina* has a narrow range in the study region (geographic range = 14,900 sq km), within which it occurs in several conservation reserves, including the Dhimurru, Laynhapuy and Anindilyakwa IPAs. Despite its restricted occurrence, there are no major threats facing the taxon. However, the larval food plant is currently listed as NT under the *TPWCA* because of its limited AOO and impacts from mining activities.

Blue-banded Egfly

Hypolimnna alimena (Linnaeus, 1758)



Plate 112 Mosquito Creek, Gove Peninsula, NT
Photo: M. F. Braby



Plate 113 Mt Burrell, NT
Photo: M. F. Braby

Distribution

This species is represented by the subspecies *H. alimena darwinensis* Waterhouse & Lyell, 1914, which is endemic to the study region. It is restricted to the Top End, where it generally occurs in the higher rainfall areas (> 1,000 mm mean annual rainfall), although it has been recorded in drier areas at Wongalara Wildlife Sanctuary (Braby 2012a) and Ngukurr (Normand 2009), NT. Its geographic range corresponds well with the spatial distribution of its native larval food plant. The food plant, however, extends slightly further south-west to the Port Keats area. Outside the study region, *H. alimena* occurs from Maluku, including the Kai and Aru islands, through mainland New Guinea and adjacent islands and north-eastern and eastern Australia to the Bismarck Archipelago and the Solomon Islands.

Habitat

Hypolimnna alimena breeds in the ecotone between riparian evergreen monsoon vine forest and savannah woodland where the native and introduced larval food plants grow as herbs in the ground layer (G. Martin, pers. comm.). Males also congregate on hilltops in open woodland to locate females during the wet season, but they do not breed in these habitats.

Larval food plants

Pseuderanthemum variabile (Acanthaceae); also **Asystasia gangetica* (Acanthaceae); possibly *Brunoniella* spp. (Acanthaceae).

Seasonality

Adults occur throughout the year. They show little seasonal variation in abundance, although they appear to be more numerous during the 'build-up' (October and November) and again towards the end of the wet season (April). We have no records of the immature stages, but breeding is apparently limited to the wet season (November–April) (G. Martin, pers. comm.). During the dry season, adults retract to moist refuges, such as riparian evergreen monsoon vine forest or mixed paperbark forest with rainforest elements along perennial creeks or swamps, where they remain settled in deep shade. Presumably, females stop breeding and remain in reproductive diapause during the long dry season.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Varied Eggfly

Hypolimnna bolina (Linnaeus, 1758)



Plate 114 Wongalara Wildlife Sanctuary, NT
Photo: M. F. Braby



Plate 115 Wanguri, Darwin, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *H. bolina nerina* (Fabricius, 1775). It occurs very widely throughout the region, extending from moist coastal areas to drier inland areas of the semi-arid zone (< 400 mm mean annual rainfall), where it has been recorded as far south as Tennant Creek (Mary Ann Dam), NT (J. Archibald). It has also been recorded on Ashmore Reef in the Timor Sea, WA (D. C. Binns). The geographic range broadly corresponds with the spatial distribution of the putative native larval food plant (*Alternanthera denticulata*), as well as with the known food plants, all of which are introduced. Outside the study region, *H. bolina* occurs widely from Madagascar, India, Japan and South-East Asia, through mainland New Guinea and adjacent islands to the islands of the South Pacific. It also occurs throughout much of the Australian continent.

Habitat

Hypolimnna bolina breeds in open woodland and open disturbed areas, including suburban parks and gardens, where the introduced larval food plants grow as annual or seasonal perennial herbs, often in moist shaded areas beneath trees.

Larval food plants

**Asystasia gangetica* (Acanthaceae), **Synedrella nodiflora*, **Tridax procumbens* (Asteraceae), **Sida acuta* (Malvaceae); probably *Alternanthera denticulata* (Amaranthaceae), which is a food plant in Queensland (Braby 2000). The native food plants have not been recorded in the study region.

Seasonality

Adults occur throughout the year, but they are most abundant during the wet season (November–April), with a peak in abundance in March and April, and least abundant in the late dry season (August–October). During the dry season, adults retreat to moist refuges such as riparian forest or woodland along gullies and creeks, where they overwinter. The immature stages have been recorded sporadically only during the warmer months of high humidity (October–May). Presumably, females stop breeding and remain in reproductive diapause during the dry season (May–September), similar to populations in northern Queensland (Jones 1987; Kemp 2001).

Breeding status

This species is resident in the study region.

Conservation status

LC.

Danaid Eggfly

Hypolimnna misippus (Linnaeus, 1764)



Plate 116 Mt Burrell, NT
Photo: M. F. Braby

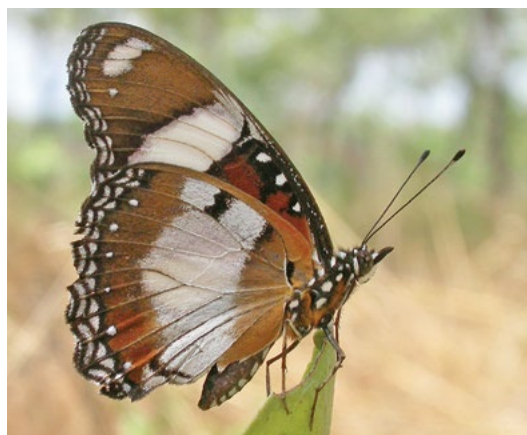


Plate 117 Fish River Station, NT
Photo: M. F. Braby

Distribution

This species occurs in the Kimberley and Top End of the study region. It extends from moist coastal areas to drier inland areas, generally above 800 mm mean annual rainfall. It occurs sporadically from the Buccaneer Archipelago at Koolan Island in Yampi Sound, WA (Koch and van Ingen 1969; McKenzie et al. 1995), to the Roper River area, NT, near the Gulf of Carpentaria. The larval food plant is considerably more widespread, extending to the semi-arid zone as well as across the Top End. Further field surveys are thus required to determine whether *H. misippus* occurs in the eastern half of the Top End, particularly north-eastern Arnhem Land. Outside the study region, *H. misippus* occurs widely from Africa, Madagascar, India and South-East Asia, through mainland New Guinea and eastern Australia to the Solomon Islands and Norfolk Island, as well as in coastal regions of north-western South America (K. Willmott, pers. comm.).

Habitat

Hypolimnna misippus breeds in open disturbed areas where the larval food plant grows as an annual herb. Males also congregate on prominent hilltops to locate females during the wet season, but they do not breed in these habitats.

Larval food plant

Portulaca oleracea (Portulacaceae).

Seasonality

Adults occur throughout the year, but they are observed more frequently during the latter half of the wet season (February–April), although they are never encountered in large numbers or high densities. Very few adults have been recorded during the dry season (June–October). The breeding phenology is not well understood. The immature stages (larvae or pupae) have been recorded during the late wet season (March and April), when adults are most abundant, and freshly emerged adults have also been collected around this time (March–May). However, it is not clear how the species survives the dry season when foliage of the larval food plant is absent. Presumably, the species breeds seasonally during the wet season and females then stop breeding and remain in reproductive diapause during the dry season.

Breeding status

This species is assumed to be resident in the study region.

Conservation status

LC.

Crow Eggfly

Hypolimnna anomala (Wallace, 1869)



Plate 118 Christmas Island, WA
Photo: Frank Pierce



Plate 119 Christmas Island, WA
Photo: Frank Pierce

Distribution

This species is represented in the study region by the subspecies *H. anomala albula* (Wallace, 1869). It is known from only two specimens, both males, from Darwin, NT: one collected in March 1909 by F. P. Dodd (Waterhouse and Lyell 1914; Gibb 1977; Common 1978) and the other in February 1987 by C. G. Miller (Braby 2000). Outside the study region, *H. anomala* occurs in South-East Asia and north-eastern Australia, where it is probably not established.

Habitat

The breeding habitat of *H. anomala* has not been recorded in the study region. One of the specimens was collected in semi-deciduous monsoon vine thicket at East Point Reserve, NT (Meyer et al. 2006).

Larval food plants

Not recorded in the study region.

Seasonality

The seasonal abundance and breeding phenology of this species are not well understood. The two adults were recorded during the wet season (February and March).

Breeding status

Hypolimnna anomala does not appear to have become permanently established in the study region. Presumably, it is a rare vagrant from the Lesser Sunda Islands.

Conservation status

NA.

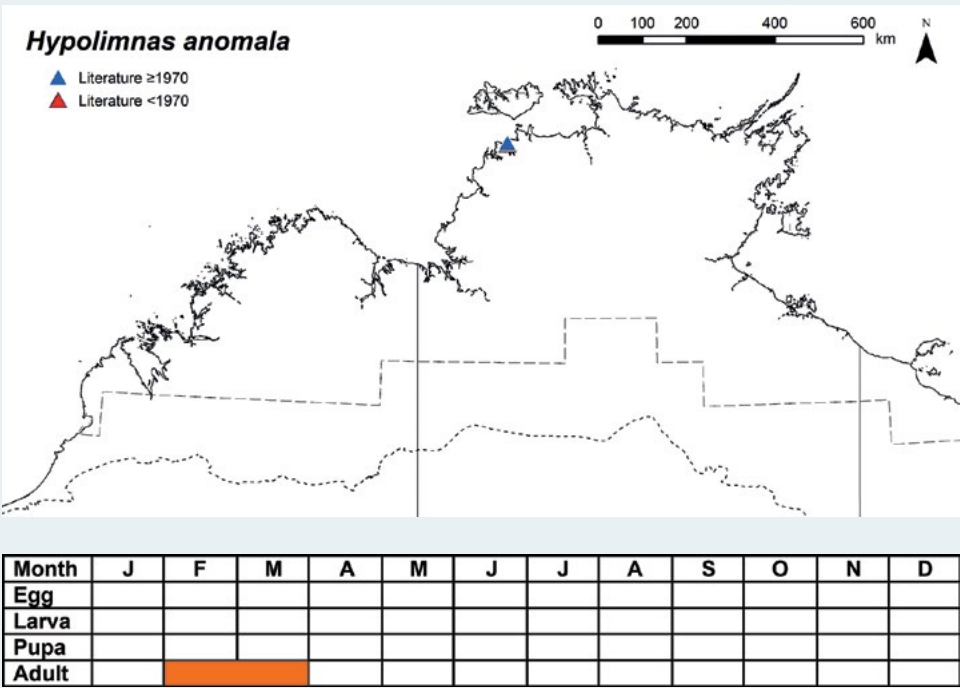


Photo: Florence Creek, Litchfield National Park, NT, M.F. Braby

Tailed Emperor

Charaxes sempronius (Fabricius, 1793)



Plate 120 Fish River Station, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *C. sempronius sempronius* (Fabricius, 1793). It occurs widely in the Kimberley, Top End and western Gulf Country, extending from moist coastal areas to drier inland areas of the semi-arid zone (c. 400 mm mean annual rainfall). It has been recorded as far south as 16 km east–north-east of Anna Plains Station and Broome, WA (Warham 1957); 7 km north–north-east of Helen Springs Homestead near Renner Springs, NT; and Boodjamulla/Lawn Hill National Park (Constance Range), Qld (Dunn 2015a). The geographic range corresponds well with the spatial distribution of the known larval food plants. Outside the study region, *C. sempronius* occurs throughout north-eastern, eastern and south-eastern Australia, and Lord Howe Island.

Habitat

Charaxes sempronius breeds in a wide variety of habitats, including monsoon forest and eucalypt woodland where the larval food plants grow as trees. It also occurs in suburban parks and gardens. Males readily congregate on hilltops to locate females, but the species does not breed in these habitats.

Larval food plants

Celtis australiensis (Cannabaceae), *Acacia hemsleyi*, *Peltophorum pterocarpum* (Fabaceae), *Vitex acuminata* (Lamiaceae); also **Mimosa pigra* (Fabaceae). This highly polyphagous species (see Braby 2000) undoubtedly uses a much wider range of plants than current records from the study region indicate.

Seasonality

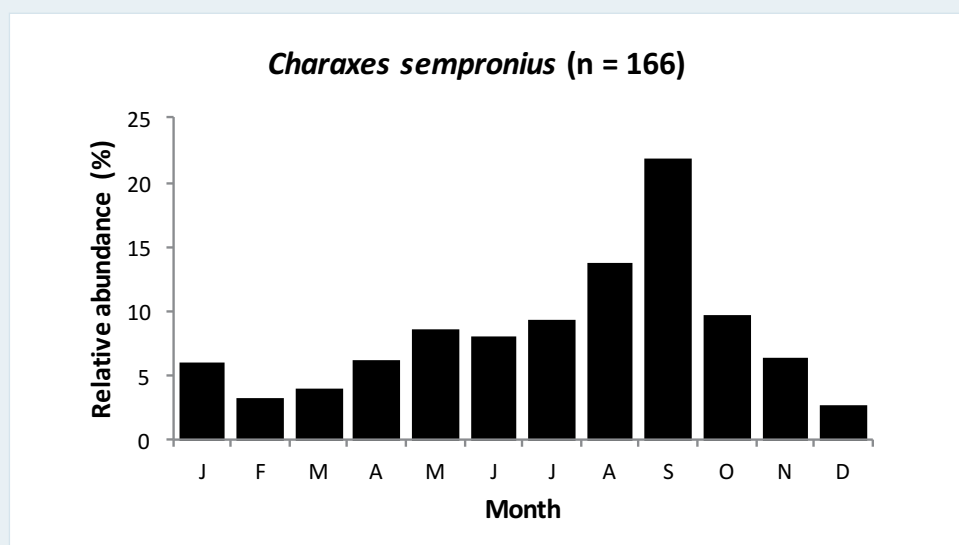
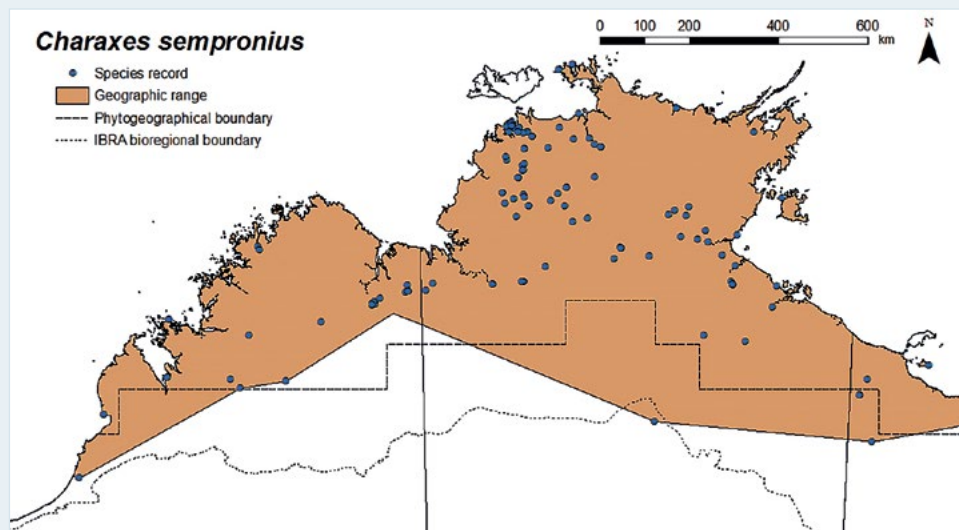
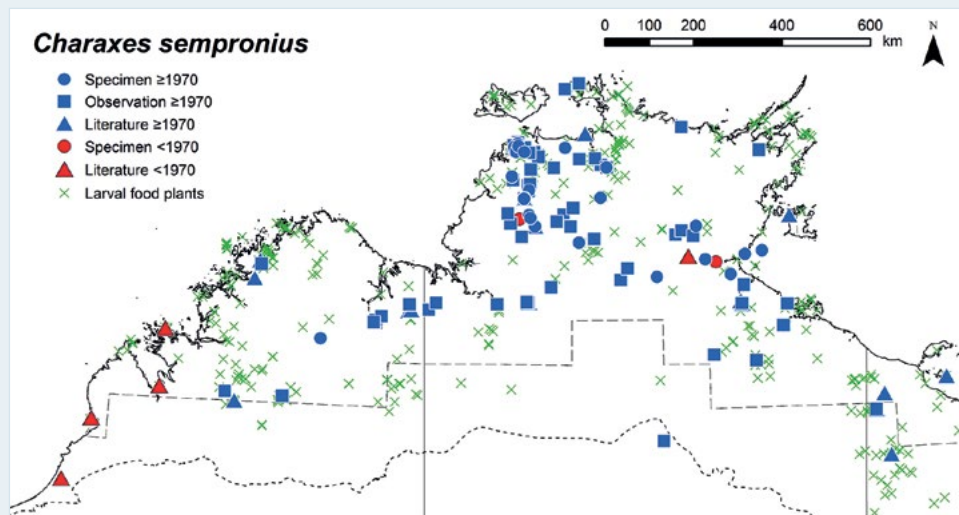
Adults occur throughout the year, but they are observed more frequently during the late dry season, with a pronounced peak in abundance in September, although they are never encountered in large numbers or high densities. The breeding phenology is not well understood. The immature stages have been recorded sporadically during the dry season (April–October). Presumably, the species also breeds in the wet season and several generations are completed annually.

Breeding status

This species is resident in the study region.

Conservation status

LC.

[illegible]

Evening Brown

Melanitis leda (Linnaeus, 1758)



Plate 121 Connors Range, St Lawrence, Qld
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *M. leda bankia* (Fabricius, 1775). It occurs widely in the Kimberley, Top End and the western Gulf Country, extending from moist coastal areas to drier inland areas of the semi-arid zone (< 700 mm mean annual rainfall). It has been recorded as far inland as 4 km north of Argyle Diamond Mine, WA (G. Swann); Newcastle Creek near Newcastle Waters, NT (Dunn and Dunn 1991); and Gregory River Crossing, Gregory Downs, Qld (Dunn 2015a). The geographic range corresponds well with the spatial distribution of its known native larval food plants, indicating that *M. leda* has been well sampled in the region. Outside the study region, *M. leda* occurs widely from Africa, Madagascar, Mauritius, India and South-East Asia, through mainland New Guinea and adjacent islands and north-eastern and eastern Australia to the Solomon Islands, New Caledonia, Fiji and Tahiti.

Habitat

Melanitis leda occurs in a variety of habitats, but it usually breeds in riparian areas along the banks of rivers, creeks and swamps that support evergreen monsoon vine forest, mixed eucalypt open forest and paperbark swampland or open forest with rainforest elements where the larval food plants grow as perennial or annual grasses (Braby 2011a, 2015e); it usually favours the ecotone or edges of these habitats.

Larval food plants

Imperata cylindrica, *Ischaemum australe* (Poaceae); also **Cenchrus pedicellatus*, **Cynodon radiatus*, **Megathyrsus maximus*, **Oryza sativa*, **Sorghum vulgare* (Poaceae).

Seasonality

Adults occur throughout the year, but they are most abundant after the monsoon rains and during the cooler part of the dry season (April–July). Breeding is strictly seasonal, with the immature stages occurring only during the wet season and early dry season (November–May), when their larval food plants, which consist of a suite of native and introduced grasses, are available and several generations are completed. Presumably, females stop breeding and remain in reproductive diapause and aggregate in moist refuges during the mid to late dry season (July–October), similar to populations in northern Queensland (Jones 1987).

Breeding status

This species is resident in the study region.

Conservation status

LC.

Dingy Bush-brown

Mycalesis perseus (Fabricius, 1775)



Plate 122 Cardwell, Qld
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *M. perseus perseus* (Fabricius, 1775). It is distributed throughout the Top End and more sporadically in the western Gulf Country. It occurs mainly in the higher rainfall areas (> 800 mm mean annual rainfall); however, it has been recorded in lower rainfall areas of the semi-arid zone, including 20 km south of Mataranka (L. and B. R. Reid) and Bessie Spring (Braby 2000), NT; and Doomadgee, Qld (Puccetti 1991), as well as in the Gulf of Carpentaria at Walker Creek 36 km east of Karumba, Qld, just outside the eastern boundary of the study region (Dunn 2015a). Its geographic range falls within the spatial distribution of its putative larval food plants (*Dichanthium sericeum*, *Heteropogon* spp., *Themeda triandra*), which occur widely in northern Australia. Outside the study region, *M. perseus* occurs widely from India and South-East Asia, through mainland New Guinea and adjacent islands and north-eastern Australia to Vanuatu.

Habitat

Mycalesis perseus occurs in a variety of woodland habitats where the putative larval food plants grow as seasonal perennial grasses.

Larval food plants

Not recorded in the study region; probably *Dichanthium sericeum*, *Heteropogon* spp., *Themeda triandra* (Poaceae), as well as other native and introduced grasses, which are the food plants in north-eastern Queensland (Braby 2000).

Seasonality

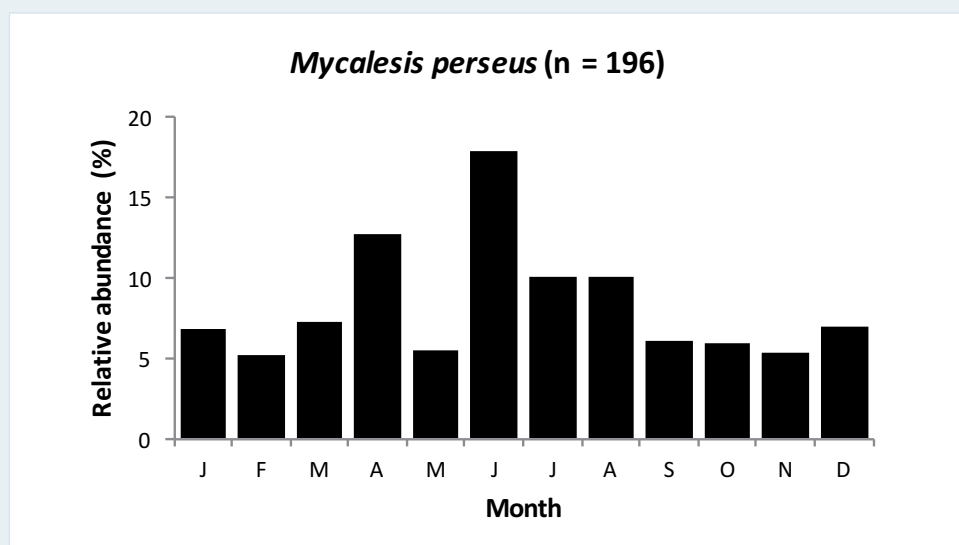
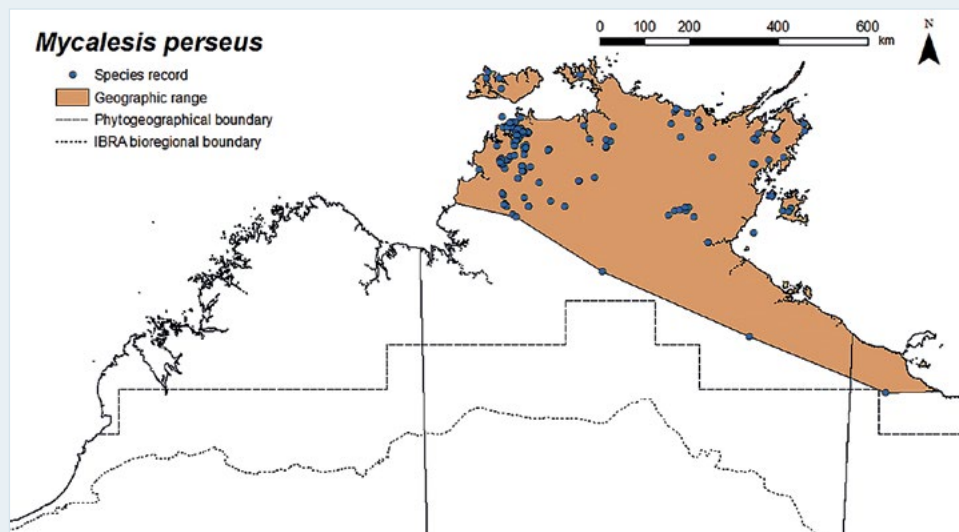
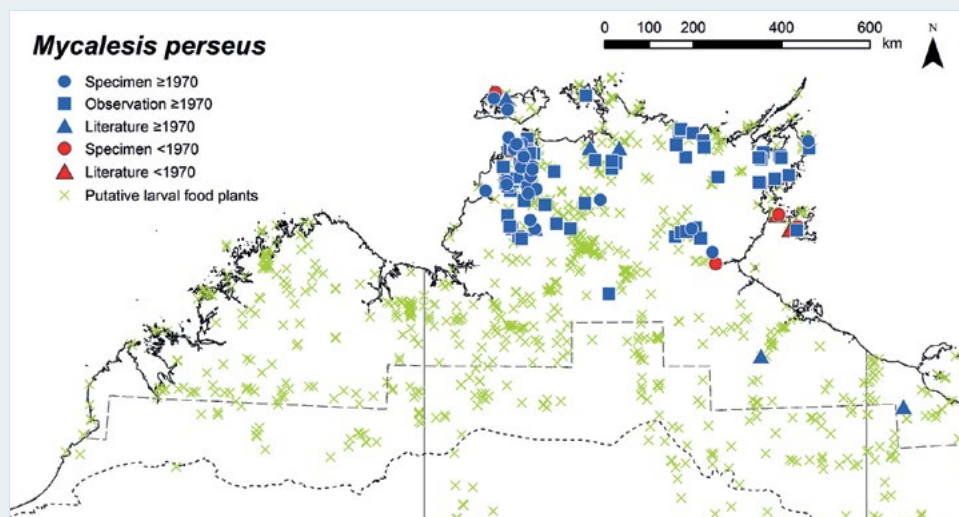
Adults occur throughout the year, but they are most abundant after the monsoon rains and during the cooler part of the dry season (April–August), with a pronounced peak in abundance in June. We have very limited information on the breeding phenology and incidence of the immature stages of this common species. Presumably, the seasonal history is similar to populations in northern Queensland in which breeding is strictly seasonal and limited to the wet season and early dry season, when their putative larval food plants are available and several generations are completed, and females stop breeding, remain in reproductive diapause and aggregate in moist refuges during the mid to late dry season (May/June–November/December), depending on the timing of rainfall (Braby 1995a, 1995b).

Breeding status

This species is resident in the study region.

Conservation status

LC.

[illegible]

Cedar Bush-brown

Mydosama sirius (Fabricius, 1775)



Plate 123 Baralminar River near Gapuwiyak, NT
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *M. sirius sirius* (Fabricius, 1775). It is restricted to the Top End, where it occurs in the higher rainfall areas (> 800 mm mean annual rainfall). It reaches its southernmost extent at Bradshaw Field Training Area (Fitzmaurice River catchment) (Archibald and Braby 2017), Mataranka (Dunn and Dunn 1991) and Costello Outstation 25 km north-east of Ngukurr (S. Normand), NT. The geographic range falls within the spatial distribution of the known and putative larval food plants. Although the food plants are much more widespread, searches in the Kimberley and western Gulf Country have not detected *M. sirius* in these areas. Outside the study region, *M. sirius* occurs from Maluku, through mainland New Guinea and adjacent islands to north-eastern Australia.

Habitat

Mydosama sirius occurs mainly in paperbark swampland where the putative larval food plant (*Ischaemum australe*) grows as a perennial grass, but it may also breed along the edges of riparian evergreen monsoon vine forest, where alternative grasses are used (Braby 2015e). It also occurs in the edges of floodplain wetlands, where it undoubtedly breeds.

Larval food plants

Imperata cylindrica (Poaceae); probably *Ischaemum australe* (Poaceae), which is a food plant in north-eastern Queensland (Braby 2000).

Seasonality

Adults occur throughout the year, but they are most abundant after the monsoon rains and during the cooler part of the dry season (April–September). We have very limited information on the breeding phenology and incidence of the immature stages. Presumably, the seasonal history is similar to populations in northern Queensland in which breeding occurs throughout the year, but reproductive activity declines as the dry season progresses, and adults are least abundant during the wet season (Braby 1995a, 1995b).

Breeding status

This species is resident in the study region.

Conservation status

LC.

Orange Ringlet

Hypocysta adiante (Hübner, 1831)



Plate 124 Nhulunbuy, NT
Photo: M. F. Braby

Distribution

This species is represented by the subspecies *H. adiante antirius* Butler, 1868, which is endemic to the study region. It occurs throughout the Kimberley and Top End, extending from moist coastal areas to drier inland areas of the semi-arid zone (c. 500 mm mean annual rainfall), where it has been recorded as far south as Palm Springs 30 km south-east of Halls Creek, WA (Williams et al. 2006); and Daguragu Aboriginal Land Trust (Giles Creek), NT. Its broad geographical range closely corresponds with the spatial distribution of its known native larval food plants. Although the food plants extend further south-east into the western Gulf Country, recent surveys of this area have not detected *H. adiante* further south than Borroloola, NT. Outside the study region, *H. adiante* occurs in north-eastern and eastern Australia.

Habitat

Hypocysta adiante breeds in a wide range of habitats, including savannah woodland, riparian woodland along seasonal and perennial creeks or riverbanks and the edges of wet and dry monsoon forests, where the larval food plants grow as perennial grasses (Braby 2011a, 2015e). It also breeds in suburban parks and gardens, where it uses a range of introduced grasses.

Larval food plants

Aristida macroclada, *Arundinella nepalensis*, *Digitaria gibbosa*, *Ischaemum australe*, *I. tropicum* (Poaceae); also **Axonopus compressus*, **Chloris* sp., **Cynodon dactylon*, **Sporobolus* sp., **Urochloa mosambicensis* (Poaceae).

Seasonality

Adults occur throughout the year. They appear to show little seasonal variation in abundance, although they tend to be more numerous after the monsoon rains and during the cooler part of the dry season (March–August). The immature stages have been recorded during a similar period (February–August). Presumably, the seasonal history is similar to populations in northern Queensland in which breeding occurs throughout the year, but reproductive activity may decline as the dry season progresses (Braby 1995a).

Breeding status

This species is resident in the study region.

Conservation status

LC.

Dusky Knight

Ypthima arctous (Fabricius, 1775)



Plate 125 Murray Falls, Tully, Qld
Photo: M. F. Braby



Plate 126 Murray Falls, Tully, Qld
Photo: M. F. Braby

Distribution

This species is represented in the study region by the subspecies *Y. arctous arctous* (Fabricius, 1775). It occurs widely in the Kimberley, Top End and western Gulf Country, extending from moist coastal areas to drier inland areas of the semi-arid zone (c. 700 mm mean annual rainfall). It has been recorded as far south as Mornington Wildlife Sanctuary (Annie Creek), WA; Bessie Spring, NT (Dunn and Dunn 1991); and Lagoon Creek crossing 17 km north-west of Hells Gate Roadhouse, Qld. The putative native larval food plants (*Imperata cylindrica* and *Themeda triandra*) occur widely in northern Australia, including both coastal and semi-arid areas, and their overall spatial distribution includes the geographical range of *Y. arctous*. Outside the study region, *Y. arctous* occurs in mainland New Guinea and adjacent islands and north-eastern and eastern Australia.

Habitat

The natural breeding habitat of *Y. arctous* has not been recorded in the study region. Adults occur in a wide variety of habitats, but they are usually associated with woodland, mixed swampland and the edges of monsoon forest or, in the drier inland areas, riparian woodland along creeks and gullies, in which they no doubt breed.

Larval food plants

**Axonopus compressus* (Poaceae); probably *Imperata cylindrica* and *Themeda triandra* (Poaceae), which are two larval food plants in Queensland (Braby 2000). The native food plants have not been recorded in the study region, but the larvae probably feed on a range of grasses.

Seasonality

Adults occur throughout the year, but they are most abundant after the monsoon rains and during the cooler part of the dry season (April–August). They appear to become scarce towards the end of the dry season during the ‘build-up’ (September–November). We have very limited information on the breeding phenology and incidence of the immature stages. Presumably, the seasonal history is similar to populations in northern Queensland in which breeding occurs throughout the year (Braby 1995a).

Breeding status

This species is resident in the study region.

Conservation status

LC.

This text is taken from *Atlas of Butterflies and Diurnal Moths in the Monsoon Tropics of Northern Australia*, by M.F. Braby, D.C. Franklin, D.E. Bisa, M.R. Williams, A.A.E. Williams, C.L. Bishop and R.A.M. Coppen, published 2018 by ANU Press, The Australian National University, Canberra, Australia.