

The demise of mass migration of the Brown Awl *Badamia exclamationis* (Fabricius 1775) (Lepidoptera: HesperIIDae): a consequence of land clearing in Queensland?

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INTRODUCTION

THE impacts of human activities on the environment are frequently measured by reference to habitat loss or the successive listing of species as extinct or threatened with extinction. There is another measure of disturbance that relates to significant behavioural change that may fall short, at least for the moment, of species loss. Brower and Malcolm (1991) first drew attention to this new conservation theme of "endangered phenomena". They defined an endangered phenomenon as a "spectacular aspect of the life history of an animal or plant species involving a large number of individuals that is threatened with impoverishment or demise". In this paper the apparent decline of seasonal long-distance migration in a skipper butterfly, the Brown Awl *Badamia exclamationis* is documented and linked to large scale vegetation clearing in Queensland.

HISTORICAL RECORDS

According to Smithers (1978) the Brown Awl "is the only recorded Australian migrant skipper." In particular, the mass nature of the Brown Awl migration and its great distance is unique for skippers. As noted by Braby (2000) adults "are most often seen during migration when flights may reach spectacular numbers". The regular nature and enormous numbers of the Queensland mass migration has been formally described since Waterhouse and Lyell (1914) mentioned "great flights of this butterfly have on several occasions been noted in Queensland". Waterhouse (1932) drew attention to the magnitude of this migration by referring to "many millions" taking wing and provided an estimate that "24 000 skippers pass over every hundred yards every hour".

Burns (1933) noted that the movement of Brown Awls in Queensland was associated with summer breeding in central Queensland. Barrett and Burns (1951) postulated a pattern whereby there was a southward migration of individuals from "the far north" in early summer that breed

in central Queensland followed by a late summer northern migration of the new generation. The northerly flight was usually the greater numerically. It is not clear where the end point of the Queensland northerly migration might be. Adults are known over a wide area of Queensland, from throughout Cape York Peninsula and the Torres Strait Islands to Papua New Guinea. Although the Brown Awl is known from further north (Braby 2000), mass long distance migration appears to be a phenomenon unique to Queensland.

The northern flight (late summer), consists of fresh adults produced from the vast forests of Yellowwood *Terminalia oblongata* trees in central Queensland. From late January until April in Townsville, these adults fly north at least to the northern tip of Cape York peninsula (Fig. 1). Opportunistic reproduction occurs at this time, but it may be that at least some of these adults over-winter in the north and return south early in the following summer (passing through Townsville from September to December). Wing condition was examined for both south-bound and north-bound individuals collected in Townsville and initial results showed worn and thinner wings on the south-bound individuals, while north-bound individuals were consistently fresh (Hill and Valentine, unpubl. data).

RECENT OBSERVED DECLINE

I have been observing these Queensland flights of the Brown Awl over a period of more than 25 years, in particular as they pass through Townsville. Regular and systematic counts were not made and the exact timing and density of flights remains unknown. However, in April 1988, I recorded a northerly flight that I estimated to be equivalent to 3 600 per hour over a 90 metre transect. The last significant mass migration I recorded in Townsville was the summer of 1994/1995. This was of a similar magnitude to the 1988 flight. Since then, only a few individuals have been seen each summer and the mass waves of individuals, numbering many thousands per hour have failed to appear.

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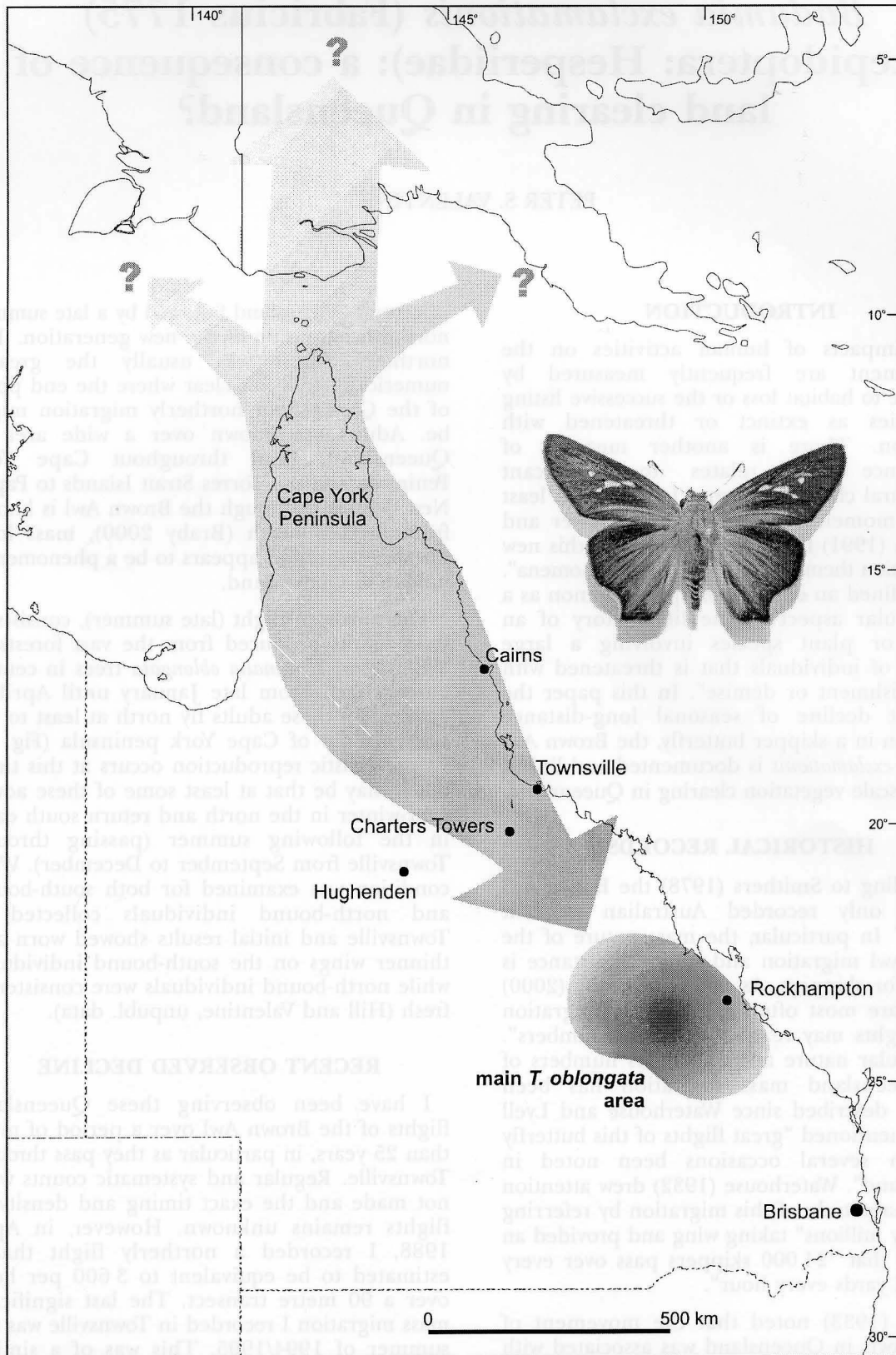


Fig. 1. The migratory path of *Badamia exclamationis* in its Queensland mass migration in relation to the main area of *Terminalia oblongata* and central Queensland tree-clearing.

In seeking an explanation for the demise of this mass migration in Queensland, the most obvious potential factor is the availability of the larval food plant in central Queensland. Original identification and mapping of Regional Ecosystems in Queensland (Sattler and Williams 1999) showed extensive tracts of land in the brigalow belt of Queensland within which Yellowwood formed a significant component. Since 1988 most of this has been cleared for cropping and pasture. For example Regional Ecosystem 11.4.9 (brigalow shrubby open forest with Yellowwood) was originally 565 000 ha in extent but by September 2000 there was less than 10% remaining and the Regional Ecosystem was declared endangered (Department of Natural Resources and Mines 2003). Similarly, Regional Ecosystem 11.4.6 (*Acacia cambagei* woodland with a Yellowwood understorey) originally covered 620 000 ha within the brigalow belt but less than 10% remains and the Regional Ecosystem is listed as endangered under the Queensland *Vegetation Management Act* (Department of Natural Resources and Mines 2003). These two Regional Ecosystems alone show a loss of over 1 million hectares through clearing for crops and pasture. All other Regional Ecosystems containing Yellowwood as a significant component of the vegetation are now listed as either endangered or "of concern". What has not yet been fully accounted is the significant flow-on effect for dependent fauna, although Recher (2002) identified a massive loss of birds in this region from clearing. The demise of the mass migration of the Brown Awl is just one of these impacts and extends the concept developed by Brower and Malcolm (1991) to include "extinct phenomena".

CONCLUSION

Although there appears no cause for immediate concern that the Brown Awl is endangered, the demise of a unique behavioural phenomenon of this species and an amazing

visual spectacle is a sad moment in the decline of Australia's biodiversity. It is one more natural wonder that the modern generation, and those to come, will have to do without. It may yet be possible to reconstruct part of the necessary habitat, but that will require not only cessation of further clearing, but a commitment to replanting at least some of the devastated areas.

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