



Gumleaf skeletoniser in the jarrah forest

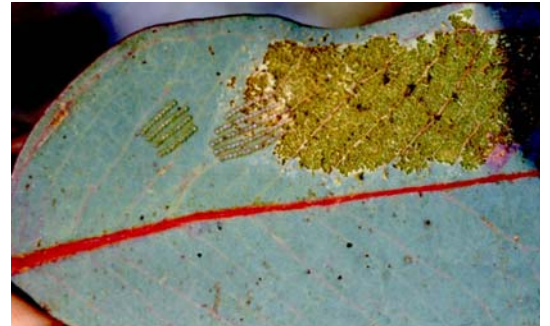
by Janet Farr, DEC Science Division, (08) 97717996, janet.farr@dec.wa.gov.au

Background

A severe outbreak of *Uraba lugens* Walker (gumleaf skeletoniser, GLS) occurred in the south-west of Western Australia during 1982-1988 causing extensive canopy defoliation of over 300,000 ha of jarrah (*Eucalyptus marginata*) forest by 1986. This outbreak was unprecedented in the history of the jarrah forest. GLS is a well known defoliator of eucalypts throughout Australia. However, in WA, with the exception of a localised outbreak in 1947 near Cowaramup (near Margaret River), GLS was known to only outbreak on isolated rural trees and was not considered a problem. During the peak of the outbreak the jarrah forest canopy appeared as though scorched by fire and discrete areas of severe defoliation could be identified from the air.

GLS is a moth in the family Noctuidae which feeds differentially on a range of eucalypts. Two main biological forms are recognised in eastern Australia: (1) a coastal/inland form, where the insect has two generations per year with 11 growth stages (instars) and eggs laid in parallel rows one egg diameter apart; and (2) a highland form where the insect has one generation per year, 13 instars and eggs laid in a clumped raft like mass with no intervening spaces. The WA population in the southern jarrah forest has characteristics of both forms, one generation per year, 11-13 growth stages and eggs laid in parallel rows. In eastern Australia outbreaks most commonly occur on *Eucalyptus camaldulensis* on which larval survival to the 5th instar is 75 per cent or higher.

The biology of GLS in the southern jarrah forest was investigated and compared to previously known features of this species from eastern Australian studies. In addition aerial and observational survey data were used in a Geographic Information System (GIS) analysis to examine the possible impact of forest management and vegetation type on this insect.



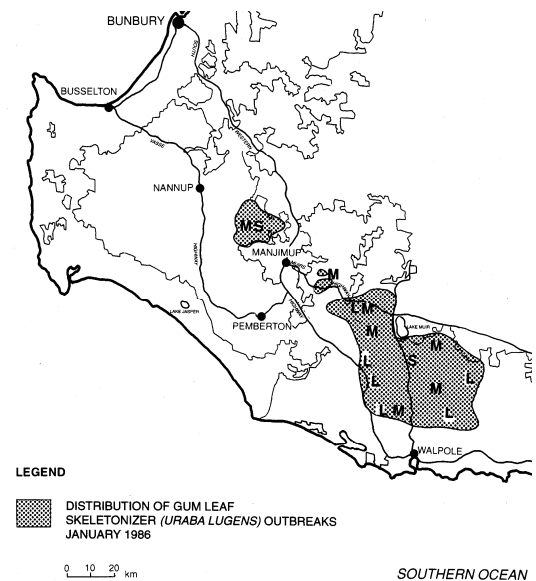
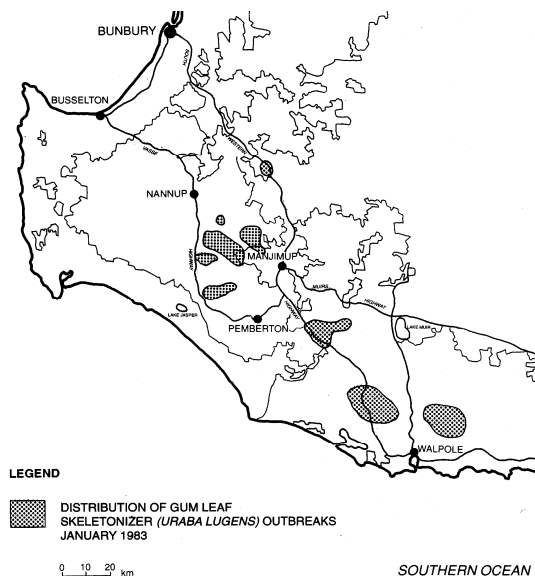
Top: egg rafts and early feeding pattern of GLS larvae.
Middle and bottom: late stage larvae showing head capsule retention, a characteristic of this moth species

Findings

Biology

- Jarrah and marri (*Corymbia calophylla*) were intermediate larval food hosts for GLS with survival to 5th instar of 41 per cent and 39 per cent respectively.

- Egg production was significantly different between outbreak and non outbreak periods, with more eggs produced during the outbreak period. GLS in Western Australia potentially produced more eggs than eastern Australian populations.
- Population modelling using climate data for Manjimup showed GLS usually has one generation per year in the southern jarrah forest. However, during two consecutive warm winters two generations per year are possible. Previous periods when conditions promoted two generations per year were 1982-83 (the start of the outbreak) and 1976-78.
- A eupholid wasp *Euplectrus* sp and an unknown mortality agent causing GLS larvae to become brown and flaccid (suspected virus or bacterium) resulted in a dramatic population decline in November-December 1988.



Maps of the southern jarrah forest showing expansion of the GLS outbreak from 1983 (left) to 1986 (right).
(letters in shaded area for the 1986 map are not necessary for map interpretation)

Spatial analysis

- Neither logging nor prescribed burning caused increases in GLS populations.
- GLS infestation was less common in forest burnt up to three years prior to the outbreak.
- GLS outbreaks were initiated in jarrah forest on marginal, poorly drained sites prone to inundation in winter and drought in summer.
- Two generation per year populations were found on the fringes of the jarrah forest, supporting the hypothesis that two generation per year populations are more common during outbreak periods.

Management Implications

- Jarrah and marri are not preferred hosts for GLS and are therefore less likely to support a population outbreak than more preferred host trees such as *E. camaldulensis* and *C. ficifolia*.
- Given current knowledge of climate change predictions for this century, two generation per year populations will become more common in the southern jarrah forest leading to higher levels of canopy defoliation.
- Population increases leading to outbreak are most likely to start in jarrah forest on marginal sites. Stress is a significant contributor to the promotion of outbreaks of this insect, and leads to higher fecundities and thus greater larval numbers.
- Prescribed fire, especially during autumn, may increase GLS mortality and thereby reduce the spread and impact of GLS outbreaks.