GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

PARKS AND WILDLIFE SERVICE

Defoliation of jarrah in the Leeuwin-Naturaliste region of Western Australia September-October 2017

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Defoliation of jarrah in the Leeuwin-Naturaliste region of Western Australia September-October 2017

Allan J. Wills and Janet D. Farr

Occasional report

October 2017

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Acknowledgments

We are thankful for the scientific legacy of Zan Mazanec and Ian Abbott who have done much to inform the nature of jarrah leafminer outbreaks.

Summary

- Defoliated jarrah trees became visible in the Leeuwin-Naturaliste region in September and October 2017.
- Inspection revealed the trees were affected by jarrah leafminer (*Perthida glyphopa*). The destructive agents are the larvae of a small moth.
- Jarrah leafminer outbreaks can last for decades. Chronic defoliation results in crown recession and smaller growth increments. Jarrah trees are rarely killed by jarrah leafminer defoliation.
- The response to jarrah leafminer outbreak is one of informed tolerance.

1 Damage to jarrah

There are a wide variety of insects that feed upon the foliage of jarrah (Steinbauer & Nahrung 2016) as well as several syndromes including frost damage or pathogens which may result in browning of jarrah foliage. Correct identification of causal agents to jarrah crown defoliation may require professional expertise.

1.1 Inspection and identification of damage agents

Defoliated jarrah trees became visible in the Leeuwin-Naturaliste region in September and October 2017. Defoliation manifests as browning of jarrah foliage, usually in contrast to surrounding marri foliage which remains unaffected (Figure 1). Jarrah defoliation is most visible in the landscape in the vicinity of Yallingup Siding and Yelverton National Park. Affected jarrah is detectable in a wider area inspected, extending from Vidler Rd between Yallingup and Dunsborough to Rosa Brook in the south (Figure 2).

Figure 1 Damage on foreground jarrah contrasting with undamaged marri in the background.

Inspection revealed the trees were affected by jarrah leafminer (*Perthida glyphopa*). The destructive agents are the larvae of a small moth. The current outbreak of jarrah leafminer in the Leeuwin-Naturaliste region has some precedents. Jarrah leafminer is known from the Busselton area since 1880 and the Yallingup area since 1909 (Abbott *et al.* 1999a), and outbreaks were recorded in the region between 1971 and 1983 (Mazanec 1974, Abbott 1992).

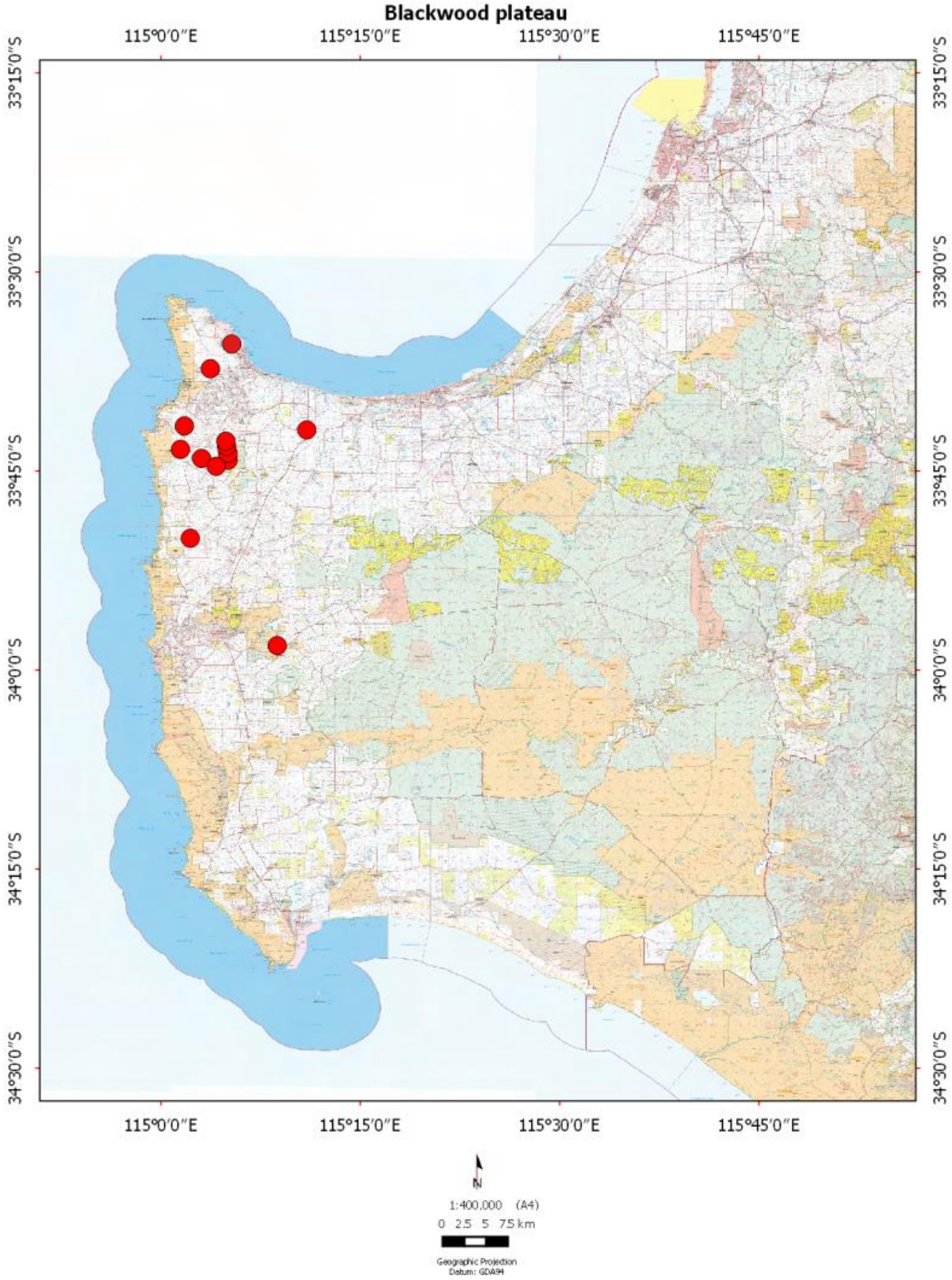

Figure 2 Some occurrences of jarrah leafminer damage (●) in the Leeuwin-Naturaliste region.

1.2 Life cycle and biology of jarrah leafminer

The life cycle and biology of jarrah leafminer are known (Wallace 1970; Mazanec 1983, 1987, 1989). For a recent detailed synopsis see Steinbauer & Nahrung (2016). Adult moths emerge from litter and soil in April to May, and females mate then deposit eggs into the lower epidermis of the host leaves. During winter and early spring the larvae excavate a mine within the leaf by consuming the leaf tissue while leaving the outer epidermal layers intact. Larvae which succeed to maturation in September-October encase themselves in oval shaped portions of the epidermal layers by stitching them together with silk. These oval cells are cut out from the leaf and fall to the ground leaving oval shaped holes in the leaves (Figure 3). The encased larvae aestivate in the soil until the following April. The browning of foliage peaks in visibility in October as mines reach maximum area, and occluded portions of green tissue on heavily mined leaves die off.

Figure 3 Jarrah leaves with browning and holes caused by jarrah leafminer larvae.

1.3 Consequences of and response to outbreak

Jarrah leafminer outbreaks can last for decades (Abbott 1992, Mazanec 1996, Abbott *et al.* 1999a). Chronic defoliation results in crown recession (Abbott *et al.* 1995, Wills *et al.* 2004) and smaller growth increments (Mazanec 1974, 1999). Jarrah trees are rarely killed by jarrah leafminer defoliation and jarrah saplings can survive annually repeated complete defoliation for 15 years or more (Wills *et al.* 2004). The scale of Jarrah leafminer outbreaks renders broad scale control by insecticides uneconomical and ineffective (Van Didden 1967), and ecologically

inappropriate (Chagnon *et al.* 2015). Appropriately timed fire can temporarily reduce local populations (Abbott *et al.* 1999b). However, foliage flushed after fire can be more favourable to jarrah leaf miner oviposition and development (Mazanec 1989, 1999), and outbreak populations quickly re-establish from cooler burnt areas within fire boundaries and from outside fire boundaries. Over the longer term, outbreak populations have diminished without human intervention from many areas severely affected in the 1960s, 1970s, and 1980s, although areas of outbreak remain. The response to jarrah leafminer outbreak is therefore that of informed tolerance.

Glossary

Aestivate	Spends the dry season in a state of inactivity
Chronic defoliation	Repeated removal of leaves
Epidermis	The “skin” of leaves
Outbreak	Insect populations large enough to damage plant growth
Oviposition	Egg laying

References

Abbott I (1992) Records of outbreaks of defoliating insects in jarrah forests, south-west Western Australia, from 1960 to 1990. Technical Report No. 28. Department of Conservation and Land Management, Perth, Western Australia.

Abbott I, van Heurck P, Burbidge T, & Wills A (1995) Cutting out the leafminer. *Landscope* 11(1), 43–47.

Abbott I, Wills A, & Burbidge T (1999a) Historical incidence of *Perthida* leafminer species (Lepidoptera) in southwest Western Australia based on herbarium specimens. *Australian Journal of Ecology* 24, 144–150.

Abbott I, Wills A, & Burbidge T (1999b) Reinfestation of *Eucalyptus marginata* ground coppice by jarrah leafminer after scorch by autumn or spring fires. *Australian Forestry* 62, 160–165.

Chagnon M, Kreutzweiser D, Mitchell E A, Morrissey CA, Noome DA, & Van der Sluijs JP (2015) Risks of large-scale use of systemic insecticides to ecosystem functioning and services. *Environmental Science and Pollution Research* 22(1), 119–134.

Mazanec Z (1974) Influence of jarrah leaf miner on the growth of jarrah. *Australian Forestry* 37, 32–42.

Mazanec Z (1983) The immature stages and life history of the jarrah leafminer, *Perthida glyphopa* Common (Lepidoptera: Incurvariidae). *Journal of the Australian Entomological Society* 22, 101–108.

Mazanec Z (1987) Natural enemies of *Perthida glyphopa* Common (Lepidoptera: Incurvariidae). *Journal of the Australian Entomological Society* 26, 303–308.

Mazanec Z (1989) Jarrah leafminer an insect pest of jarrah. In B Dell, JJ Havel, N. Malajczuk (eds). *The Jarrah Forest- A complex Mediterranean Ecosystem* (pp. 123–132). Kluwer, Dordrecht.

Mazanec Z (1996) Key factor analysis of population data for *Perthida glyphopa* Common (Lepidoptera: Incurvariidae). Division of Entomology Technical Report No, 67. CSIRO, Canberra.

Mazanec Z (1999) The influence of the jarrah leafminer *Perthida glyphopa* Common (Lepidoptera: Incurvariidae) and prescribed burning on the girth increment of jarrah *Eucalyptus marginata* Donn ex Smith. *Australian Forestry 62*,172–181.

Steinbauer MJ & Nahrung HF (2016) Native Defoliators of Australian Mediterranean Forest Trees. In *Insects and Diseases of Mediterranean Forest Systems* (pp. 431–454). Springer International Publishing.

Van Didden GW (1967) Aerial spraying of jarrah leaf miner in W.A. *Forest Notes* 5, 21–24.

Wallace MMH (1970) The biology of the jarrah leaf miner, *Perthida glyphopa* Common (Lepidoptera: Incurvariidae). *Australian Journal of Zoology* 18, 91–104.

Wills AJ, Burbidge TE, & Abbott I (2004). Impact of repeated defoliation on jarrah (*Eucalyptus marginata*) saplings. *Australian Forestry* 67, 194–198.