Government of Western Australia
Department of Parks and Wildlife

Tree decline investigation - Quindanning road October 2014

Peter White, Nature Conservation Officer. Great Southern District

File Reference No.: 2009-2351

Date: 4/12/14

Phone: 98819215 Fax: 98811645

Email: peter.white@dpaw.wa.gov.au

Keywords: *Eucalyptus rudis*, *Creiis periculosa*, Quindanning

Summary

Following a report of massed tree death in an area to the west of Narrogin, staff from the Great Southern District undertook a detailed site inspection. The problem, initially thought widespread across the landscape, was confined to one tree species, *Eucalyptus rudis* Endl. (WA Flooded Gum) and the causal agent was identified as *Creiis periculosa* (Western Horned Lerp). Following this investigation, concerns about other possible causes such as herbicide damage can safely be discounted. Concern about the event being the massed death of trees can also be alleviated – this is a defoliation event and whilst some trees may succumb to prolonged lerp attack, the majority are likely to recover.

It is recommended that this event be documented and a copy of this report lodged in the Depts. library at Kensington. The sites should be monitored opportunistically over the next 12 months.

Introduction

On 29th October 2014, I was contacted by Colleen Fulford from the (Main Roads Dept (MRD) in Narrogin – she had received a report from one of her supervisors citing problems with many trees along the Williams – Quindanning road. There were two main concerns expressed; firstly, was the apparent death of the trees linked to recent MRD roadworks, and secondly, were the trees actually dead. If it was the former, then roadverge management practices would need urgent review. If the latter was the case, this may require extensive cleanup of the roadverges to maintain road safety. Images provided by the MRD gave some clues, but the information provided was fragmentary and could not serve as the basis for an adequate assessment.

On 4th November, accompanied by Mrs. Fulford, I inspected the site to make a more detailed assessment of the trees.

Location

The site investigation followed the Quindanning – Williams road from Quindanning townsite eastwards.

Photo points were established along the way (see Map 1 and Appendix 1):

1 & 2	Williams River bridge, Quindanning
3	Curteis road junction
4	Mundays road crossing, Williams River
5	Chapman road junction

Symptoms

Of the four major tree species observed in the area only *Eucalyptus rudis* appeared to be affected, with symptoms being absent from *Corymbia calophylla*, *E. marginata* and *E. wandoo*.

The symptoms typically were of dead or dying leaves, some that had died a few months ago and others, which were in the throes of dying. The entire canopies of the trees were affected (Fig 1) and, with the exception of some regrowth, all size classes were affected. Almost all of the trees in the population were affected regardless of the landscape position[1], soil type, or moisture availability. Some groups of trees within the affected area did not appear to be affected at this stage, but closer examination revealed the presence of developing lerps.

There was a noticeable boundary on the easterly edge of the infestation (see Map 1); however, the westerly extent exceeded the scope of this study. A phone conversation with Allan Wills (Senior Technical Officer, DPaW Manjimup) revealed that the damage was also very noticeable along the Preston Valley and the Balingup area.

Figure 1 foliage damage to mature *E. rudis*

Subsequent investigations noted the same problem occurring on many trees in the Perth metropolitan area, the coastal strip between Armadale and Pinjarra, as well as along the Albany Highway.

[1] Note – in this area *E. rudis* can be found high up on the profile, almost to the top of some hills, whereas typically it is confined to the riparian zone

Closer examination of the foliage revealed masses of *Creiis periculosa* (Western Horn Lerp).

The lerps appeared to have been active for several weeks, possibly months, and from the differing times of leaf death it would appear that there has been at least two generations of the lerp this season.

Figure 2 initial leaf damage

Figure 3 secondary leaf damage

Also, on some foliage there were a number of smaller lerps indicated insects of a younger age (possibly a third generation. Some clusters of reddish eggs were observed on some of the coppice but it is uncertain if these were lerps or another species. Some other damage was observed (Fig 4) including that caused by Leaf Blister Sawfly (Fig 5), but this was thought secondary to the lerps as it was only observed on a few trees.

Figure 4 damage to leaf surface

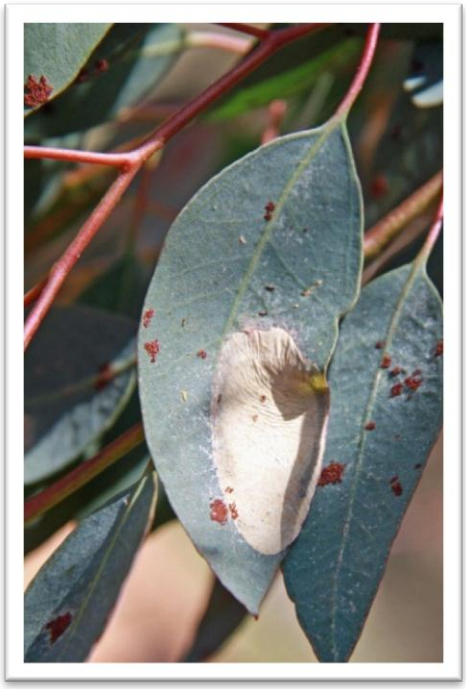


Figure 5 leaf blister sawfly

The trunks and branches were examined, but no signs of significant borer damage could be observed. Occasional signs of mechanical damage were observed on some trees e.g. machinery, animal browsing, but this was not thought to be a contributing factor to the health of the tree compared with the lerp damage.

Some trees in the area were completely dead, or in the process of dying (Fig 6); however it was clear that these trees had been dying for a number of years, most likely from causes unrelated to the current problem. Some appeared similar to the decline that had occurred along the Preston River in the 1990's, but this was thought to be beyond the scope of this investigation.

Figure 6: dying E. rudis Curteis rd.

The trees were examined at many points along the road while the possible causes of the decline were assessed. Though the primary symptoms were abundant and obvious, a range of other factors were explored as part of this investigation; these include:

Factors consider	Comments
Moisture availability	Though the area had received lower than average rainfall over many years, the tree generally occur on moisture gaining sites. At the time of inspection, many creeks were still running and the grasses had not started to cure indicating this was not likely to be a contributing factor
Inter tree competition	The symptoms were evident across stands of all densities
Weed competition	This varied from nil in grazed paddock to a very heavy weed burden along creeklines and did not appear to influence the pattern of symptoms
Salinity / waterlogging	No symptoms of salinity were observable on the foliage and many of the affected trees were outside of the areas where prolonged waterlogging would occur. Also, *E. rudis* has a naturally occurring riparian species and has a high tolerance of waterlogged conditions. Some unseasonal heavy rainfall had occurred in recent weeks, but the symptoms were evident before this event
Fire	Much of the area had been unburnt for many years; however, the occasional roadverge tree that had been affected by grass fires had recovered. Burnt and unburnt trees appeared to be affected equally
Plant pathogens	*Eucalyptus rudis* is recorded as being resistant to *Phtophthora cinammomi*, though there is some question about its susceptibility to other *Phytophthora* species. Some of the trees appear to have gone through phases of dying back and recovery, followed by subsequent dying back as it typical with *Phytophthora*. However these trees were confined to discrete areas and atypical compared with what was happening across the rest of the landscape. No understorey species appeared affected, though it's uncertain how many of the Wheatbelt species react to *Phytophthora* spp.

Factors consider	Comments
Herbicide drift	The foliage lacked the symptoms attributable to herbicide and whilst it is likely that herbicides had been applied in some areas, the symptoms were spread over such a large area and crossed many property boundaries making aerial drift extremely unlikely. Symptomatic plants were also observed on a property where no herbicides are used. Similarly, for overland flow, there would be little opportunity for this to occur from adjacent paddocks.
	Some roadside spraying had been carried out recently by the MRD and whilst the effects were evident on the roadside vegetation, the boundaries of the spraying were readily evident and were not visible beyond the target area.
Fertilizer drift	The distribution of *E. rudis* across the landscape i.e. generally in lower lying areas, means that fertilizers could have concentrated and influenced tree growth (hence susceptibility to insect attack). However, symptomatic trees were evident in many areas where no fertilizer application is likely to have occurred; hence, it is not thought to be a contributing factor.
Frost	The area is subject to periodic frosts and the landscape positions were the trees occur could make them susceptible to damage. However, this species is known to be frost resistant, the symptoms are not consistent with frost and there are many affected trees high in the landscape outside of the frost zone.
Soil compaction	This may have resulted around some trees due to many years of cropping and grazing. However, the distribution of affected trees across the landscape, on roadverges and major drainage lines (fenced) discounts this notion

Discussion

Eucalyptus rudis is known to be frequently attacked by a number of insect species such as *Creiis periculosa* (Western Horned Lerp) and *Phylacteophaga froggattii (*Leaf blister sawfly) though *Perthia* sp. (Rudis leaf miner) is thought to be more common.

Decline in *E. rudis* due to insect damage has been documented on several occasions (see reference list). At other times, a pathogen is thought to be the primary cause, particularly along the Preston River, though there not been a satisfactory explanation to that event.

Insect attack on *E. rudis* and *E. marginata* has been observed in the area by the author on several occasions over the last two decades. At times, the damage has been widespread, at others it has been confined to small patches (though this may reflect the time of the visit rather than the final extent of the damage). At the time of the investigation the lerp damage had not been observed along the Narrogin Wandering road or the Brookton Highway, however since then the damage has been observed in these and other areas indicating it may continue to spread.

Lerp attacks are also well known on other native tree species, for example the widespread defoliation of *Eucalyptus occidentalis* by *Cardiaspina jerramungae* in the late 1980's.

In many instances, the trees will recover from an insect attack and there is some evidence of coppice already sprouting from the upper branches of many trees. In cases of prolonged insect attack, which may severely damage the tree, there is evidence that this epicormic growth will eventually form a replacement crown (Fig 7).

Fig 7. epicormic development replacing previous tree crown

Conclusion

There has been much speculation about what causes the various declines of *E. rudis*, including a lack of understorey plants, eutrophication and the presence of previously undetected forms of *Phytophthora* spp.. However, in this instance, the cause is readily evident by an examination of the foliage. Herbicide damage can be discounted – as can many other possible causes. Whilst it is uncertain how long the present lerp infestation will last for, there is a strong likelihood that most trees will recover from having been defoliated.

Reference / further reading

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

Abbott, .I (1999). Dieback in flooded gum. *Western Wildlife: Newsletter of the Land for Wildlife Scheme* 3(4), p. 3.

Clay, R. and Majer, J. (2001) Flooded Gum (*Eucalyptus rudis*) Decline in the Perth Metropolitan Area: A Preliminary Assessment. Curtin University Bulletin No 19.

Extract from Hansard [COUNCIL - Thursday, 28 February 2002] p8000c-8001a Hon Dr. Chrissy Sharp; Hon Kim Chance.

Mazanec, Z. (1989). Jarrah leafminer, an insect pest of jarrah. pp. 123-131 in Dell, B. (ed.). *The Jarrah Forest*. Dordrecht: Kluwer Academic Publishers

Stone, C., Chestnut, K., Penman, T. & Nichols, D. (2010). Waterlogging increases the infestation level of the pest psyllid Creiis lituratus on Eucalyptus dunnii. Australian Forestry, 73 (2), 98-105.

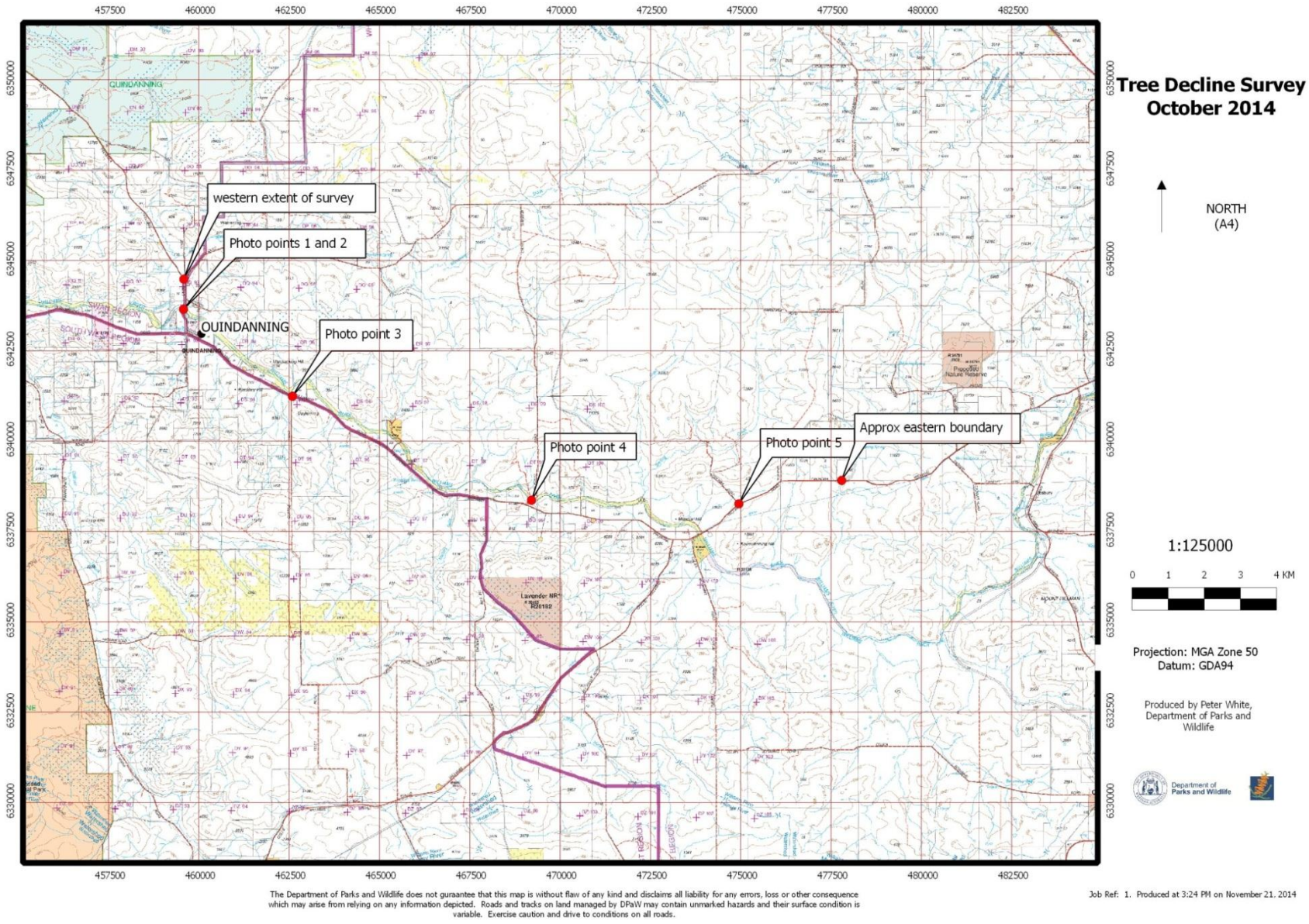
Taylor, K. L., (1965): A note on Creiis periculosa Olliff Homoptera Psyllidae. Proceedings of the Linnean Society of New South Wales, 89 (1964): 250-253.

Taylor, K. L, (1992): Two New Species of Cardiaspina Crawford (Hemiptera: Psyllidae) from Western Australia and Tasmania. J. Aust. ent. SOC., 1992, 31: 171-175 171

Yeomans, V. (1999). Historical and present day patterns in the decline of flooded gum (*E. rudis* Endl) along Preston River, Donnybrook, southwest WA. Unpublished Honours thesis, Department of Botany, Uni. of WA. (Note, an excerpt of her findings can be found in Western Wildlife Vol. 4, No. 1, January 2000).

Image and Report Storage

T:\407-Operations (District)\Shared Data\Nature Conservation report library\Plant pests diseases and weeds



Map 1. Survey area and photo points

Appendix 1

Photo point 1: Quindanning road bridge looking northeast

Photo point 1: Quindanning bridge looking south east

Photo point 2: approx. 150m south of Quindanning bridge looking west

Photopoint 3: Curteis road looking north east

Photopoint 3: Curteis road looking north north west

Photo point 4: Munday road crossing looking north east

Photo point 5: Chapman road looking north west

Photo point 5: Chapman road looking north west – 80mm zoom lens