A TREE FAILURE DATA BASE

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***Eucalyptus camaldulensis* (River Red Gum)**

Eucalyptus camaldulensis (River Red Gum) is a large tree reaching 25-35 metres in height with a broad spreading crown. As the tree matures it can develop buttress roots from its very thick trunk. *Eucalyptus camaldulensis* is the most wide spread and best known of the Australian eucalypts. As the common name would suggest it is generally found along waterways and on floodplains. Despite this it is a very adaptable tree and will grow in a wide variety of soils and conditions.

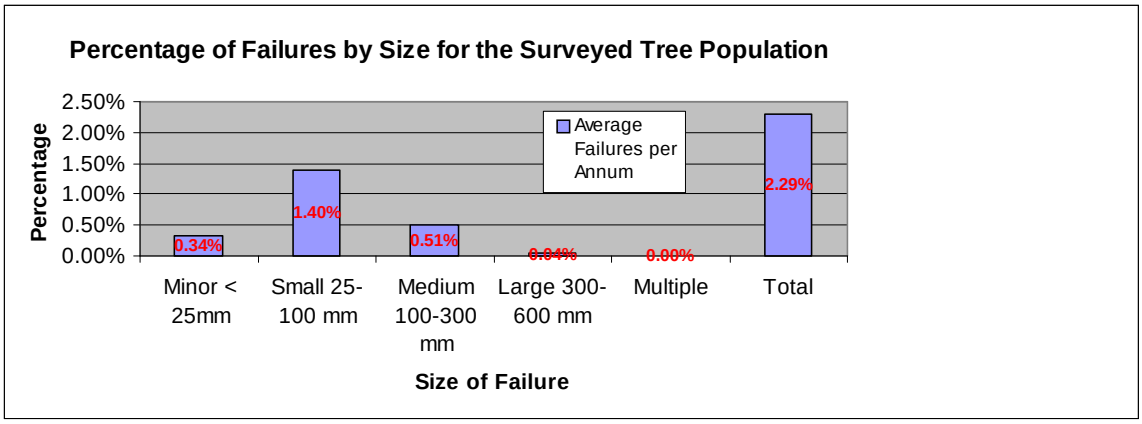
It is often said that this species drops branches with a greater propensity than other species and that the rate and type of branch drop is unpredictable. There have been a number of recent court cases where this species has been described as a notorious branch dropper and is regularly recommended for removal due to this reputation. This type of statement does not appear to be based on research or documented evidence but rather on anecdotal evidence and as such is potentially flawed. Anecdotal evidence from people who are looking at trees in an adhoc manner is likely to result in an above average number of trees with problems. We regularly get a request to attend to a problem but rarely are we asked to look at trees that have no problems.

At the 1998 ISAAC Conference Burnley College lecturer Leigh Stone delivered a paper on Sudden Limb Failure (SLF). In this paper Stone identified nine trees by genus considered to be common candidates for SLF. *Eucalyptus camaldulensis* along with *E. cladocalyx* and *Corymbia citriodora and C. maculata* were identified as native species with potential for SLF along with seven other non-native species. Within the paper Stone identified that the majority of the evidence on SLF and species propensity was based on anecdotal evidence and that further research was required, he also noted that SLF is not all that common and the majority of failures occur as a result of structural flaws and/or severe wind. Stone also noted, again anecdotally, that a failure pattern may be specimen specific within a species, using the example of a line of trees where one or two trees in similar condition will exhibit a history of ongoing branch failure.

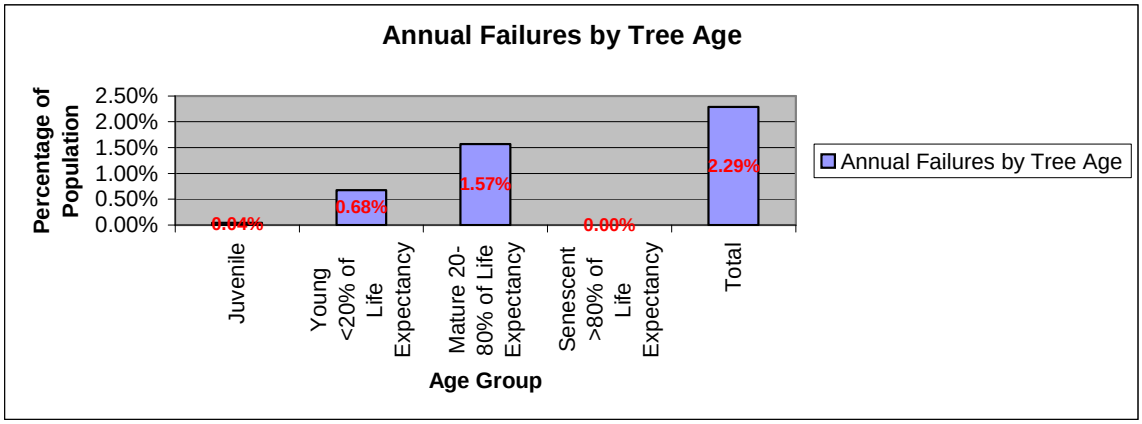
A survey of 472 *Eucalyptus camaldulensis,* at a number of locations in Adelaide, was carried out in 2005 to look at branch failure history with the aim of determining the propensity of the species for failure. Of the surveyed trees 346 trees or 73.31% of the population had no evidence of branch failure; 128 trees or 26.69% of the population had evidence of branch failure, the range of failure age was from less than twelve months to greater than 50 years. Of the trees that contained failures 54 trees or 11.44% of the population were shown to have a history of failure within the last 0-5 years.

In order to determine the number of failures per year it is important to be able to assess the age of the failure site within the tree. As wound sites age identifying the period since failure becomes increasingly inaccurate.

To achieve a reasonable degree of accuracy for the Probability of Failure it was decided to use the trees with failures within the last five years to calculate a percentage of the population that fail on an annual basis. If it is taken that the failure rate is even over the five-year period then an average 54/5 = 10.8 trees fail per annum. This equates to 2.29% of the surveyed population.



One of the considerations was to determine if the maturity of the tree had any bearing on either the number of failures and/or their size. The collected data indicates that trees that are considered to be mature (i.e. within the range of 20-80% of their natural life expectancy) and have a history of failure account for 1.57% of the population or 68% of the trees that fail on an annual basis. Of the surveyed group 278 trees were identified as being mature and an annual failure rate of 7.4 trees was calculated from the collected data; this equates to 2.66%. On an annual basis the largest group of failure sizes was 4.06 failures in the 100-300 millimetre range or 1.46% of the mature tree population.



Conclusion

1. *Eucalyptus camaldulensis* will fail for a variety of reasons throughout its life cycle.

2. An individual *Eucalyptus camaldulensis* has a higher propensity for failure in maturity.

3. The size of branch most likely to fail on a mature *Eucalyptus camaldulensis* is in the 100-300 millimetre range.

4. The probability of a mature tree dropping a 100-300 millimetre branch is 1.46% or 1:68.5.

5. The data does not indicate that an overly high percentage of the population will drop branches. Rather it identifies that 73.31% of the surveyed population have not dropped branches.

The data does not compare *Eucalyptus camaldulensis* with other species to determine if it has a higher or lower propensity for limb drop than other trees with a similar reputation. It does however give us a starting point for further tree species failure assessment. Further assessment of the failure type will be required to determine the reasons for branch failure. Is it SLF, a structural flaw or extreme weather conditions? This may be discovered by researching existing tree failure databases and extrapolating the figures into a population based survey.

Where to Now

1. Further refinement of the data collection set is required to more closely align it with the relevant risk assessment models such as the QTRA – Size of Part range.

2. A larger scale survey of the broader population and comparison of urbanised trees with their natural state cousins.

3. Similar studies of other at risk and also reputably sound tree species to determine the probability of failure and to create a comparative system to identify tree species that truly are at risk.

REFERENCES:

Stone, Leigh. 1998. Sudden Limb Failure. International Society of Arboriculture Australia Chapter Conference Proceedings, Managing Tree Hazard, First National Conference, Melbourne 1998.