## Tree Hollows in jarrah and marri

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This work covered three areas: the occurrence and abundance of hollows, the longevity of hollow bearing trees, and strategic risk assessment.

**Key findings**:

- Defined the relationship between tree age and diameter for jarrah and marri
- Determined the age of hollow bearing jarrah and marri and the ages of trees bearing hollows suited to various bird and mammal species.
- Identified 130 years as a realistic minimum age to hollow formation for forest management purposes.
- Determined that the minimum Primary Habitat tree diameter (70 cm) corresponds to a tree age of 171 years.
- Developed descriptions of the ranges of hollow sizes used by various species of birds and mammals
- Developed an improved method of defining the dimensions of hollows used by fauna
- Produced basic data on: hollow occurrence, distributions of hollow sizes, interrelationships between hollow dimensions, shapes of hollows, hollow orientations, and the order and sizes of branches bearing hollows.
- 90% of hollows in the forest are borne on trees with diameters between 20 and 100 cm.
- Approximately 100 hollows/ha in the jarrah forest. About 90% of these are small, ie. about 10 hollows/ha are potentially usable.
- Identified the relationship between hollow occurrence and the following tree attributes: tree age, DBH, crown size, crown condition, tree status (alive/dead), tree species, amounts of dead wood in the crown, termite damage, and tree lean. These are the basis of the current prescription.
- **Predictive relationships developed. These enable predictions of hollows occurrence across the forest for individual fauna species and allow investigation of different H tree retention strategies for specific fauna goals, eg. Preferential stand management for particular species modelling population viability across forest**
- Examined factors affecting habitat tree longevity and determined the relationship between probability of tree fall and tree and stand attributes.
- Identified relationship between log attributes and occurrence of hollows (CWD component by Matt Williams).
- Assessed risk to different species as a basis for determining hollow management strategies.

### Management Implications and Recommendations

- Core information has already been included in Habitat tree prescriptions.
- The progression of fauna management requires the establishment of explicit fauna management goals where possible.
- Include crown senescence in future forest inventory work to enable and improve the Department of Conservation & Land Management's ability to predict hollow availability across the forest.
- Distinctively mark Potential Habitat trees to distinguish them from actual Habitat trees for the uninformed observer

- With fox baiting fauna populations are dynamic. We need to monitor fauna and adapt management to cater for the changes in habitat demand as fauna populations increase. Predictive models allow modeling of these scenarios.

# A WORKSHOP ON ENVIRONMENTAL EFFECTS OF TIMBER HARVESTING IN THE JARRAH FOREST

**Perup Forest Ecology Centre**
**7&8 May 2001**

**A synthesis of recent research by the Science Division, Department of Conservation & Land Management**

## 1. Objectives of the workshop

a) To provide forest managers and policy-makers with a comprehensive overview of research findings relevant to the environmental effects of timber harvesting in the Jarrah forest;

b) To identify mechanisms by which current research findings can be incorporated in the revision of silvicultural guidelines and the next Forest Management Plan (FMP).

## 2. Format for sessions

Presenters were asked to:
- Briefly overview the methodology used in their study, sufficient to make results interpretable.
- Summarise the key findings, giving priority to those that have implications for management and that can be manipulated by future silvicultural practices.
- Make recommendations for changes to management practices that could be considered in the context of the next Forest Management Plan.

## 3. Summary of presentations

Attached are brief summaries of most presentations made at the workshop, together with a statement from the authors regarding the key management implications of their findings:

- *Short term impacts of logging on understorey vegetation in the Jarrah forest* (Neil Burrows, Bruce Ward & Ray Cranfield).
- *Evaluation of key soil indicators of sustainability in Australian Mediterranean forests* (Kim Whitford)
- *Using electromagnetic induction to estimate soil salt storage* (Joe Kinal)
- *Hydrological response to logging in the intermediate rainfall zone of the jarrah forest* (Joe Kinal)
- *Logging and burning impacts on cockroaches, crickets and grasshoppers, and spiders in Jarrah forest* (Ian Abbott and colleagues)
- *Short-term Impacts of Logging on Birds in a Jarrah Forest at Kingston* (Graeme Liddelow)
- *Tree hollows in Jarrah and Marri* (Kim Whitford)
- *Response of terrestrial vertebrates to timber harvesting at Kingston* (Adrian Wayne and colleagues)
- *Brushtail Possum (Koomal) responses to timber harvesting at Kingston* (Adrian Wayne and colleagues)

- *Western Ringtail Possum (Ngwayir) responses to timber harvesting at Kingston* (Adrian Wayne and colleagues)

Summaries of presentations made by Keith Morris on management of the Chuditch, and by Paul de Tores on fox baiting and on the ecology and conservation status of the Western Ringtail Possum are currently being prepared.

**4. Issues identified and discussed**

4.1 Issues were divided into three categories according to whether they were relevant to:
- meeting compliance requirements for the current FMP,
- providing direction to or constraints on the new FMP,
- modification of silvicultural guidelines and codes of practice.

4.2 Issues relating to compliance requirements for the current FMP

All of the information presented from the Kingston study and associated projects is relevant to demonstrating compliance with conditions placed on the current plan, notably:
- Ministerial Condition 3 - Precautionary approach and,
- Ministerial Condition 11 - Jarrah silvicultural trial.

Specific projects have also provided information relevant to:
- Ministerial Conditions 12 and 16 – Phased logging and high salt risk catchments,
- Ministerial Condition 13 – Habitat trees

4.3 Issues relating to preparation of the next FMP

An appropriate and achievable scale for managing and monitoring achievement of ESFM needs to be determined. Suitable scales could include the forest block, catchment (3rd or 4th order), or some other landscape unit.

Conservation objectives for species, guilds and communities of plants and animals that are specific enough to be measured at intervals over time need to be developed. This would provide guidance to forest managers about the success in achieving ESFM. Focus groups comprised of scientists and managers may be used to develop initial objectives. Science Division staff with specific expertise on particular aspects of ESFM should liaise with staff from SFM Division and with the team responsible for preparation of the draft plan. This needs to happen over the next 2-3 months.

Management of TEAS in the second cutting cycle under the current silvicultural prescription needs to be reviewed, in particular:
- length of time between initial gap creation and TEAS removal,
- silviculture for the second cut.

There may be merit in conducting some experimental studies at Kingston where TEAS are removed at a ten-year interval following the initial harvest, in order to determine the sensitivity of different plant and animal guilds to this disturbance. To allow ongoing silvicultural experimentation, the design of the proposed Greater Kingston National Park should aim to exclude the central group of experimental grids. Aspects of provisional reserve design have been discussed with Geoff Stoneman.

Shelterwood harvesting in the intermediate and low rainfall zone during the next planning period will be a significant influence on ecological outcomes. Important issues include:
- the extent of shelterwood silviculture that will be required because of the forest types scheduled for harvesting,
- distribution of unharvested forest retained within shelterwood areas,

- related issues of the scale and intensity of post-harvest burning, and the potential impacts on other forest values.

Adaptive management and monitoring will become even more important, including the need to monitor during the period of the next plan so that new practices can be developed as required.

Linkages between research findings and inventory databases need to be strengthened so that issues can be examined in a "whole-of-forest" context. For example, availability of hollows in standing trees can now be modelled and displayed for the public forest estate, based on Kim Whitford's algorithms and the Jarrah inventory database.

There is a need for an explicit statement about the importance of minimising undesirable forms of soil disturbance that may lead to loss of soil structure, accelerated erosion, or loss of ecological integrity of soil flora and fauna.

4.4 Modification of silvicultural guidelines and codes of practice

Ecological principles and results from research studies highlight the need to minimise the extent of disturbance in areas of the forest landscape that are excluded from harvesting (eg. TEAS, stream buffers, Diverse Ecotype Zones). Prescriptions should be specific about this requirement, and there should be provision for monitoring and enforcement during field operations.

Guidelines for management of soil disturbance during harvesting operations should be revised and expanded to include measures to minimise long-term loss of plant species richness and abundance. Factors including silvicultural treatment, season of harvesting and type of equipment used need to be taken into account.

Regeneration stocking standards need to be reviewed to determine whether a single stocking standard should be applied to all Jarrah sites, regardless of site productivity and rainfall zone. In stands with a high component of Marri, retention of a substantial number of mature standing trees may make it difficult to meet the current regeneration standard. Some future wood growth potential may need to be foregone if there are good ecological reasons for retaining a high number of mature trees.

In the light of the above three points, there is a sound case for establishing studies to compare the adequacy of regeneration and stand development under different levels of JSI treatment, including a 'no-treatment' option. Because of scaling issues, these studies will need to be conducted on an operational scale, with good liaison between Science Division and FPC staff.

Guidelines for management of habitat components in Jarrah silvicultural operations are currently being reviewed, with changes likely to:

- the definition and number of habitat trees and potential habitat trees retained,
- recommend retention of mature Balga grasstrees,
- recommend increased frequency of fox baiting in harvest areas adjacent to private property.

Marking potential habitat trees may be a useful measure in improving public perceptions of silviculture.
The process for revision and approval of changes to silvicultural guidelines needs to be made explicit and be endorsed by the Department's Corporate Executive, the Conservation Commission and Forest Products Commission.

## 5. Providing information to the public and broader scientific community about the Department's ecologically sustainable forest management research program

During the initial planning for the workshop it was envisaged that the presentations prepared by Science Division staff could provide the framework for subsequent seminars intended to provide information to the scientific community and general public. The change of State government in February and resulting acceleration in preparations for the next Forest Management Plan have made this initial proposal inappropriate. However, there will be an excellent opportunity to present an overview of ESFM research in conjunction with the public consultation phase for the Forest Management Plan. This will require development of a package of succinct and complementary presentations on a range of ecological issues affecting forests. Expertise in design and presentation should be used to assist in the development of presentations, ideally targeted appropriately for different interest groups (eg. general community, scientific community, policy makers, media).

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