FOREST IMPROVEMENT AND REHABILITATION

A brief account of the "FIRS" Programme in the Northern Jarrah Forest

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1. Introduction:

Various forms of forest improvement and rehabilitation work have been undertaken in the jarrah forest since the 1920s. Early examples include the regeneration of clearfelled stands near Jarrahdale and east of Dwellingup, the cullfelling and ringbarking programmes of the 1930s and the widescale thinning of pole stands and replanting of dieback sites during the 1960s.

The adoption in 1977, of detailed land use planning by the Forests Department, and continually improving knowledge of the jarrah dieback disease, have made it possible to develop more comprehensive rehabilitation and improvement treatments for application throughout the forest.

This work was greatly stimulated by the adoption of twenty five year mine planning procedures and financial undertakings which followed the Wagerup Alumina Refinery Agreement of 1978.

A new and more sophisticated phase of forest improvement and rehabilitation commenced in 1979 drawing upon wide Forests Departmental experience and incorporating the most up-to-date research results. The first new project was directed at the jarrah forests near areas mined for bauxite and is funded by Alcoa and executed by the Forests Department.

Known by the acronym "F.I.R.S." (The Forest Improvement and Rehabilitation Scheme) this project has been developed over the past three years into a complex and inovative forest operation. For the first time forest improvement and rehabilitation prescriptions have been designed to accommodate the key management variables, viz: land use priority, dieback, stand structure, site and landscape values.

Simultaneously, the new approach has been extended elsewhere in the northern jarrah forests to areas where long term forest values are assured.

This paper presents an outline of the procedure adopted in the current F.I.R.S. treatments and of the various factors which influence choice and implementation of different treatments in different areas.

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2. Background:

To 'improve' a forest means to try to increase the capacity of that forest to satisfy man's demands upon it. To 'rehabilitate' a forest means attempting to restore forest values following destruction or degradation.

There is a wide variety of destructive agents from whose effects a forest may require rehabilitation just as there is a variety of uses for which a forest can be improved. The situation in the Northern Jarrah Forest with respect to these factors is summarised below.

2.1 Rehabilitation - the Jarrah Dieback Story

In the northern jarrah forest the most extensive destructive agent is jarrah dieback disease. The problem of jarrah dieback is central to the whole F.I.R.S. programme. This serious forest disease is caused by a soil-borne fungus (Phytophthora cinnamomi) has has been present in parts of the forest for perhaps 50 years. Where the disease is most virulent, the forest may completely collapse and become worthless for many uses.

Intensive research into the disease over many years suggests that the following three points are basic to successful jarrah forest management in the presence of dieback:

(i) If meticulous and painstaking hygiene is practised by all forest users, then disease spread will be curtailed.

(ii) If site factors can be manipulated so as to favour the growth and vigour of the forest while disfavouring the survival and pathogenicity of the fungus, then disease impact will be reduced.

(iii) If tree and shrub species which are not susceptible to the fungus can be identified and successfully regenerated, then the restoration of forest values in diseased areas is possible. Some forest values may be able to be restored.

In it's present form and application, the emphasis of the F.I.R.S. programme is placed upon protection of the jarrah forest from the depredations of dieback and upon restoration of areas which have already been severely affected by the disease. Emphasis is strongly also placed on reducing impact in active dieback areas.

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2.2 Improvement - the Land Use Story

The community makes many different demands upon the forest. The major long-term land uses in the jarrah forest, for example, are water catchment, timber production, recreation, and conservation of flora, fauna and landscape. There are also transient activities (such as bauxite mining) which occur in the forest which must be managed so as to minimise impact on long term land uses.

The northern jarrah forest caters for seven separate long term land uses (water production, catchment protection, recreation, timber production, honey production, conservation and scientific study). A key role of forest management is to tailor each operation so as to enhance or at least maintain the designated use on each area of forest. in the long term

Understanding land use is therefore basic to the logical design of a forest improvement programme.

Thus the objective of F.I.R.S. is "To improve the capacity of the forest for long-term production of water, timber, recreation, conservation and/or other forest values". in accordance with current FD land use policy and strategies.

3. The aims of the F.I.R.S. Programme

A very large proportion of the jarrah forest is free from dieback, is well protected from the risk of infection and is satisfactorily adequately fulfilling it's land use values. demands. Rehabilitation and improvement work is not required in these forests at this stage. However, in the forest near mining operations there is a priority for F.I.R.S. work for:

(i) Areas where dieback infection has virtually destroyed the natural forest; and

(ii) Areas of only light or recent dieback infection, or diebackfree areas likely to be infected in the near future, or aggravated as a result of mining operations.

In the first of these areas, the aim of F.I.R.S. is rehabilitation to restore the full productive capacities of the site. In the second it is the improvement of the health and vigour of the forest so as to render it less vulnerable to the impact of the disease.

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To accomplish these aims, the following strategies have been adopted as the cornerstones of the F.I.R.S. programme:-

(i) To prescribe and implement forest improvement and rehabilitation procedures in accordance with designated land use priorities and site.

(ii) To monitor the forest and develop remedial treatments where the objective is not being met.

The current F.I.R.S. prescriptions were developed in 1979 and refined over the period 1980-81. A regular review and monitoring programme to test the success and appropriateness of treatments has been established.

4. Planning the Programme

Like most forest operations, F.I.R.S. is carried out according to a rolling 5 year plan which is used as a basis for preparing an annual works programme. Each annual works programme specifies the areas to be treated and the prescription to be applied.

The bulk of present F.I.R.S. activities is located in the vicinity of the bauxite mines at Jarrahdale, Dwellingup and Willowdale. Most of these areas are designated for either water production or recreation as first priority.

5. Factors considered in developing the F.I.R.S. prescriptions

A number of variables must be taken into account when drawing up a prescription for forest improvement and/or rehabilitation. The most important of these variables are: land use, dieback, forest structure, site quality and landscape values. In other words, treatments must:

(i) enhance designated land uses,

(ii) protect the forest from dieback or restore forest values destroyed by dieback;

(iii) Take into account the silvicultural history of the stand, and the inherent capacity of the site; and

(iv) improve the appearance of the forest in accordance with landscape management criteria.

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It might appear that various combinations of this number of variables could lead to an almost infinite number of treatment prescriptions. Fortunately it is possible to simplify the situation and currently only 5 separate prescriptions are used. Each site is evalutated by a process of detailed field inspection, classification of the forest and the application of this information to a flow chart to generate an appropriate prescription for a given area.

6. The Basic Treatments

Operational prescriptions prepared for forest workmen are very specific in detailing the steps at each stage in the improvement or rehabilitation process. In this paper it is more appropriate to summarize the basic treatments and discuss the underlying rationale for these.

There are two basic treatments: the first applies to areas of advanced dieback infection (areas once referred to as "graveyards"); the second applies to areas which are not advanced dieback. The treatments vary as follows:

6.1 In the advanced dieback zone

In areas classified as advanced dieback, the forest ecosystem has been largely destroyed or at least so degraded by disease that forest values are no longer produced at the optimum level.

When such stands are simply left alone they may, in time, slowly regenerate to an open woodland of marri. These stands can be satisfactory for water production or some forms of recreation. However, these values can be maintained and other values recovered by the establishment of selected dieback-tolerant trees and shrubs. Optimum levels may not be attainable - may require compromise

The basic treatments in these areas therefore involve:

(i) Commercial timber is salvaged from jarrah trees which are likely to succumb to the disease. This avoids wastage of the timber resource on diseased areas.

(ii) Dead timber is stacked and burnt. This improves the aesthetics of the landscape and provides seedbed for tree and shrub species.

(iii) Surface soils are lightly scarified to improve moisture penetration

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and seedbeds.

(iv) Legumenous plants are introduced to increase soil fertility (by adding nitrogen to the soil) and improve the appearance of the area.

Depending on land use and site quality, tree planting then follows Trees most commonly used are chosen from Eucalyptus resinifera, (the red stringy bark), E. wandoo, and E. patens (W.A. Blackbutt).

Following regeneration the new stand is protected from fire until the trees are old enough to withstand a mild burn prescribed for hazard reduction purposes.

6.2 In the zones which are not advanced dieback

Such areas are either lightly infected, or dieback-free. Here the objective is one of "preventitve medicine". This involves manipulating the forest environment so as to disfavour the survival and pathogenicity of Phytophthora while favouring the health and vigour of the jarrah forest. The aim is to render the forest less susceptible to disease infection and impact.

Considerable research effort is being directed towards further exploration of this complex topic. However, best information to date suggests that the following basic 'package' is most likely to be successful:

(i) select the best trees and thin around them to encourage their growth and vigour. Where possible the thinnings are utilised for poles and posts.

(ii) push over the understorey of Banksia grandis which provides a highly favourable food base for the fungus.

(iii) Use fire to regenerate native leguminous shrubs and creepers and further reduce the populations of Banksia in the forest.

(iv) Re-organise road drainage so as to avoid concentrating water at inappropriate spots in the forest.

(v) Minimise future road access, and thus future opportunity for diebac importation.

All operations being carried out under hygienic conditions. .../7

Because this particular aspect of the F.I.R.S. work is breaking new ground, it is still regarded as largely experimental, and is subject to special monitoring processes. Prescriptions are reviewed each year, and updated as necessary to account for new research findings or the need to correct inadequacies in the existing specifications.

6. Areas treated to date

Current progress of treatment at all four minesites in the forest (i.e., Jarrahdale, Del Park, Huntly and Willowdale) is:-

	1979/80	1980/81	1981/82
Advanced Dieback	260	660	830ha
Other forest:	480	1460	495ha

7. Conclusions

Although forest improvement and rehabilitation projects have been a part of forestry in W.A. since the 1920s, the current programme is the most sophisticated. The dual aims of this project are restoration of forest values in old dieback areas and the protection and improvement of the remaining forest. Prescriptions take into account variations in land use, dieback status, site quality, stand structure and landscape values.

Although F.I.R.S. operations funded by Alcoa of Australia concentrate on treatment of forests adjacent to bauxite mine workings, similar work forms part of the Forests Department works programmes elsewhere in the northern jarrah forest.