STATE OF THE ART OF FOREST FIRE CONTROL IN WESTERN AUSTRALIA

Forests Department of Western Australia

Submission to the Standing Committee
Australian Forestry Council

Protection Branch
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SUBMISSION TO THE STANDING COMMITTEE
AUSTRALIAN FORESTRY COUNCIL

PROTECTION BRANCH
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1. FIRE SEASON 1982/83

The area of land under the direct control of the Forests Department and protected from wildfire in 1982/83 was 2,014,433 ha. In addition a measure of protection was afforded to another 850,000 ha of private and other Government land adjoining and near State Forest, through the Department's detection programme, co-operative burning ventures and neighbour-to neighbour fire suppression activities.

During the 1982/83 season, Forests Department crews attended 247 wildfires covering 4,225 ha in State Forest and another 7,288 ha outside State Forest.

The 1982/83 fire weather was generally warm and dry with an extended dry autumn period. Several periods of extreme fire danger were encountered which made for difficult and costly fire suppression activity.

The following table shows the major sources of wildfire ignition that occurred in 1982/83. These are compared with the average occurrences in the 6-year period from 1976/77 to 1981/82. It has become apparent that the incidence of deliberately lit fires is high and has been increasing steadily over the past decade.

CAUSE	1976-1982	1982/83
Deliberately lit	26%	34%
Escapes from private property burns	20	21
Escapes incidental to F.D. burns	14	14
Lightning	11	4
Hunters and fishermen	5	7
Other Government employees	3	3
Unknown	12	9
Miscellaneous	9	8
	100%	100%

2. DESCRIPTION OF CURRENT FIRE PROTECTION ORGANIZATION AND LEGISLATION

2.1 Forests Department Responsibility

The Forests Department of W.A. has exclusive management control over State Forest, Timber Reserves under the Forests Act and freehold land under the name of the Conservator of Forests. As such, the Department takes full responsibility for all aspects of fire control in these areas. In addition the Department is directly involved in the protection of large areas of other Crown Land within the State under interagency co-operative burning agreements with such land management authorities and fire organizations as the Bush Fires Board, National Parks Authority, W.A. Wildlife Authority, Shire Councils, Bush Fire Brigades and Mining Companies. A summary of Interagency Agreements is listed at 2.1.1.

The Department also provides a measure of protection to a considerable area of private and other government land adjoining and near State Forest through the Department's detection programme and neighbour-to-neighbour fire suppression activities.

2.1.1 Interagency Agreements

Interagency Agreements for hazard reduction burning have been implemented with the following organizations during the season 1982/83:

Bush Fires Board	11 separate agreements
National Parks Authority	2 " "
Dept. of Army	1 agreement
R.A.A.F.	1 "
Public Works Department	2 separate agreements
W.A. Wildlife Authority	1 agreement
Department of Mines	1 "
Alcoa of Australia	1 "
Worsley Timber Company	2 separate agreements

A full list of the 1982/83 Interagency Agreements is attached at Appendix 1.

Apart from these co-operative burning agreements, the Forests Department maintains a close involvement with these organizations and other agencies through provision of the following fire control services:

- aerial detection and wildfire intelligence
- suppression resources and advice
- fire training schools and field days
- technical advice on, and provision of fire equipment and radio links
- co-ordination in State fire emergencies.

2.1.2 Permit Holders

(a) Timber Permit Holders:
In accordance with the Forests Act Regulations, sawmill permit holders and licencees are required to co-operate with the Forests Department in preventing and suppressing wildfires within or adjacent to the permit area. The permit holders will pay for any suppression costs incurred unless they can prove that the cause of the fire was completely beyond their control.

(b) Large Mining Companies:
Specific arrangements have been made with large mining companies such as Alcoa of Australia and Worsley Alumina under the Management Agreement Acts covering aluminium mining and refinery operations in which -

> "the company will take all such necessary precautions as may be indicated by the forest officer to prevent the occurrence or spread of any fire within or adjacent to the leased area" (Alumina Refinery Agreement Act No. 3 of 1961 (Alcoa) and Alumina Refinery (Worsley) Agreement Act No. 67 of 1973).

These companies are also liable for payment of extra costs incurred in fuel reduction burning and other fire prevention activities. All sawmill permit holders and

mining companies operating on forest lands must comply with and observe the provisions of the Bush Fires Act of 1954.

2.2 Bush Fires Board Responsibility

The Bush Fires Board comprises of representatives of Government Departments, including the Forests Department, Country Shires and other relevant agencies such as Police, Westrail, Bureau of Meteorology, Forest Products Association and State Insurance.

The Bush Fires Board's role in the State's fire organization is:

(a) Legislative - B.F.B. is a statutory body responsible for the administration of the Bush Fires Act.

(b) Advisory - to local authorities (shires) in all matters relating to fire prevention and suppression. It also assists and advises at least 970 Bush Fire Brigades, made up of about 30,000 volunteer fire fighters.

(c) Planning - through development of District Fire Protection Plans, which involve agreements with Shires, Brigades and land management authorities (e.g. W.A. Wildlife Authority, Westrail, Department of the Army, National Parks Authority).

(d) Operational - support on fire prevention and suppression to local Brigades, e.g. on-site assistance on fire suppression tactics, communications, intelligence.

(e) Training - of Brigade members. Three levels of training provided (Basic, Intermediate, Advanced) plus specialised schools (e.g. Fire Weather).

(f) Providing Access - to the State's resources during fire emergencies. The B.F.B. is the focal point for interdepartmental liaison at both State and Federal levels.

Under Section 21 of the Bush Fires Act, where very dangerous fire weather conditions exist or where extensive fires are burning, a Bush Fire Emergency can be declared by the Minister for Lands, acting on a recommendation by the Director of the Bush Fires Board. The B.F.B. is empowered to commit State and Federal resources to reinforce local Shire efforts during such emergency periods.

A very close working relationship exists at executive and field operation levels between the B.F.B. and Forests Department officers. In particular, the B.F.B. Liaison Officers provide an important link at the interface, between the Forests Department, adjoining private landholders and other Government land managers.

2.3 Co-ordination Involving -

2.3.1 State Emergency Services and National Disasters Organization

The Forests Department has a close liaison with the W.A. State Emergency Service (WASES) which is responsible for the planning, training, education, organization and co-ordination of the community, and support and welfare agencies in State disasters. WASES provides financial and resource assistance until such time as normal government functions can be reinstated.

Where disasters are of such magnitude that they exceed normal S.E.S. resources, application is made through the National Disasters Organization (N.D.O.) for extra assistance.

2.3.2 Role of Defence Forces

The Armed Forces can be called on as part of the WASES arrangement to assist with specific duties during State fire emergencies. This was the case during Cyclone Alby. However, it was apparent from this exercise, that these important resources could be more effective if some advance

training in wildfire suppression and support roles had been implemented. Furthermore, a faster response from the Armed Forces could be effected if they are placed on alert whenever high emergency situations are most likely to develop.

2.3.3 Role of Command Centres

Whenever a Bush Fire Emergency has been declared for a defined area by the Minister for Lands, the State Bush Fire Emergency Plan is implemented.

Under this Plan, fires are categorized into four defined stages of development. Government instrumentalities, departments and resources may be committed to assist with fire control under Stages III and IV. Under these stages, the State Command Centre is the Bush Fires Board State Headquarters in Perth. This Centre provides facilities, at State level, for the control, administration and co-ordination of support to the rural fire organizations and the Forests Department.

The Operational Fire Headquarters will continue to be either at the Shire Office, or the Divisional Forestry Headquarters, depending on the tenure of the location of the fires.

2.4 Legislation

The State's legislation relating to the unlawful use of fire, and fines and sentences are covered by the following:

(a) Forests Act (No. 8 of 1919)
Relevant Sections include 46, 47, 48.

(b) Forests Act Regulations (1957)
Relevant Regulations include 133, 134, 136, 140, 141.

Copy of (a) and (b) attached (Appendix 2).

(c) Bush Fires Act of 1954
A copy of Fire Law (1983 Edition) summarizing the important sections of the Bush Fires Act is attached (Appendix 3).

2.4.1 Breaches of Legislation

Although the Forests Department will prosecute offenders involved in flagrant breaches of the Forests Act, it places much greater emphasis on public education and warnings on the illegal use of fire. The issuing of fire infringement notices is left with the Local Authorities.

2.4.2 Fire Bans

Under the provisions of the Bush Fires Act, the lighting of fires is prohibited during certain times of the year in most districts throughout the State. Except for some pastoral areas, the State has been divided into zones and Prohibited Burning Times have been declared by the B.F.B. for each zone.

In addition, Restricted Burning Times are also declared by the B.F.B. and these generally relate to periods immediately prior to and following the Prohibited Burning Times. Local authorities are empowered to lengthen the Prohibited Burning Times by periods of 14 days of set dates, if they consider that seasonal conditions warrant a variation of the burning times. Provision is also made for the Forests Department to obtain a suspension of the prohibited period to enable protective burning to be carried out.

Where very hazardous fire weather conditions exist or where extensive fires are burning, the Minister may declare an emergency period for a defined area. Under this declaration no person may light a fire without Ministerial permission.

In addition to the foregoing situations, legal restraints on the use of fire can be applied automatically when the bush fire danger index forecasts issued by the Bureau of Meteorology are either "Very High" or "Extreme".

Barbecue and cooking fires (including gas fires) are regarded as "fires lit in the open air" and as such are also banned during restricted, prohibited or emergency fire ban periods. Local authorities are empowered to waive such bans in special circumstances.

2.4.3 Harvesting Bans

Under the Bush Fires Act harvesting machines may not be operated during restricted and prohibited burning times unless they are equipped with prescribed exhaust systems and a fire extinguisher. The operation of harvesting machines may be prohibited or regulated on any day when it is considered the machinery is likely to cause a fire. A local authority may arrange for the banning of harvesting operations for the whole district.

Logging operators, permit holder, licensees and private contractors are required to comply with the sections of the Forests Act and the Bush Fires Act and to regulations made under these Acts (including the Code of Softwood (and Hardwood Regrowth) Logging Practices) for the purpose of controlling fire.

Operators must take all precautions to prevent ignition and spread of fires in the work site area including:

- fitting of exhaust systems to chainsaws and logging machinery
- provision of pack spray fire extinguishers for all operators and machines
- fire-safe practices by all operators.

Logging operations under Departmental control may be suspended by a forest officer at such times when, in his opinion, such action is warranted.

Logging crews are required to assist with suppression of wildfire in proximity to the work site, at the expense of the contractor, unless it can be proven that the fire was not in any way caused by the logging operators.

2.4.4 Police Powers of Evacuation

The W.A. Police Department has no legislative powers to forcibly evacuate residents from their homes in fire

emergency situations. Although Police officers have an evacuation role under the WASES Emergency Fire Plan, they are not empowered to force those residents to leave who are unwilling to do so.

2.5 Conclusions and Recommendations

The F.D's role in fire control extends well beyond the State Forest boundaries. This involvement is likely to expand even further through increased implementation of mutual aid arrangements with neighbouring land managers.

Interagency Agreements formalizing these arrangements are regarded as having immense value in clarifying fire control responsibilities and tasks of all parties concerned, and enabling effective sharing of pooled resources.

The fire control commitments by large forest users such as logging and mining companies, are regarded as essential components to the overall forest fire control effort.

Co-ordination between the F.D., B.F.B. and other fire organizations is essential to the State's fire control.

Current legislation in fire control (Bush Fires Act) is compatible with all the Department's fire control policies and measures.

There is a need for national uniformity in the legislation relating to Police powers of evacuation in fire emergencies.

Advance training of the Armed Forces on specialized fire control functions should be considered in the case of large scale fire emergencies.

The trained Armed Forces should be placed on automatic alert during periods of very high fire danger.

3. FIRE PREVENTION MEASURES

3.1 Fuel Reduction Programmes

The Western Australian Forests Department has the legal responsibility of preventing uncontrolled fires threatening life, community assets and forest values in the State Forest area of the south-west area of the State. Although wildfire is a natural part of the Australian environment, modern society cannot tolerate destruction of such values as life, property, timber, water catchments and natural conservation values, where this can be prevented or minimised.

A policy of fire exclusion was practised by the Forests Department from soon after its creation in 1918, up to 1953. During this time the continued build-up of fuel made wildfire suppression progressively more difficult and almost impossible, even on days of moderate fire danger.

In 1954 the policy was changed to one of fuel reduction by prescribed burning. This was given greater impetus following the recommendations of the Royal Commission set up to investigate the severe wildfires of 1961.

The considerable success achieved in this State and the many bitter experiences of other States have clearly demonstrated that the most effective means of wildfire control is through the practice of broadscale rotational prescribed burning to reduce fuel accumulation on the forest floor. Without this technique of wildfire control a massive expansion of the suppression organization would be necessary.

The policy of fuel reduction burning involves the carefully controlled technique of running low intensity fires through the forest under prescribed conditions.

Spring season of operation is favoured over autumn due to the greater number of days available with suitable safe burning conditions and less risk of fire escape and forest damage.

The frequency of burning rotations applied is based on the knowledge that our suppression can be expected to control wildfires under summer conditions in fuels of 8 tonnes/ha in jarrah forest and 19 tonnes/ha in karri forest types. The rate of accumulation of litter and debris varies with forest and canopy type, but 5 to 8 years represents the average range of rotations for hazard reduction burns.

The burning standards aimed for are listed in the Fire Control Section of the W.A. Foresters Manual (Part 9, paras 9.042 and 9.043. Copy attached Appendix 4). The precise burning standards are achieved through the implementation of comprehensive pre-burn prescriptions and preparations and the discriminant application of fire weather forecasts and fire behaviour prediction guides, by trained officers. Post-burn inspections by either aerial reconnaissance or ground inspection crews, are carried out to plot the actual area burned and determine the quality and effectiveness of each burn.

The Forests Department has direct protection responsibility over 2,014,433 ha of State Forests and Timber Reserves, plus another 350,000 ha of Crown Lands by way of interagency agreements with other land authorities. Of this total area approximately 80 per cent is subject to regular fuel reduction burning on rotations that vary in the main from 5 to 8 years.

Not all State Forest is subject to fuel reduction burning on rotation, e.g. areas of long-term scientific study, flora and fauna habitat management areas and fire sensitive hardwood regrowth stands and pine plantations.

In grassed pine plantations (e.g. *Pinus radiata* stands in the Blackwood Valley) hazard reduction of strategic buffers is achieved by grazing. Some mechnaical crushing of logging slash is done in limited areas of high risk or high value.

Initially, fire protection was associated primarily with timber values and the adjoining life and property assets. However since the adoption by the Department of its multiple land-use policy in the mid-1970s, use of fire has been modified to meet multiple land management objectives including catchment protection, flora and fauna conservation and recreation. For example, in areas assigned to be managed for nature conservation, burns of varying frequency, intensity and season of burning have been prescribed to enhance appropriate wildlife habitats. As research and technological advances become available, burning strategies will be further modified to ensure that land-use objectives can be met more precisely, whilst ensuring the overall safety and welfare of the community.

3.2 Other Fire Prevention Measures

3.2.1 Public Education

Apart from hazard reduction programmes, the most effective means of fire prevention is through risk reduction. The Department aims to minimize the risk of fires being started by providing for public education and public warnings. The objective of public education is to make everyone fire conscious and to make the general public realise the value and necessity of fire control.

Fire prevention education programmes for schools and youth groups are provided by local staff to help younger members of society accept the doctrine of fire prevention. Pamphlets, posters and signboards are provided for forest users and travellers, whilst Divisional staff is instructed to maintain regular personal contact with neighbouring landholders and local residents, to impart information on fire control and management issues. Senior Divisional staff is responsible for the development, monitoring and regular updating of fire education and training programmes for all sections of the local community.

The Department has no formal public fire education plan. Publications such as Special Forest Focus No. 1, however, provide the public with the Department's rationale and practice for fire control. See Appendix 5 for a copy of Special Forest Focus No. 1 (1981) on "Forest Fire Management in Western Australia".

In addition, the constant presence overhead of the Department's aerial detection and aerial ignition aircraft, plus regular radio announcements on the scheduling and location of aerial prescribed burns, foster a public awareness of fire control and management.

3.2.2 Law Enforcement

See Section 2.4.

3.2.3 Aerial Detection

Wildfire detection is provided mainly by pilots under seasonal contract. The Forests Department has nine single-engine aircraft (Piper Super Cubs). Flight circuits and schedules are pre-determined to give effective coverage of high risk and high value areas in relation to the fire weather and fire danger forecasts.

Large tracts of private and other government land adjoining and near State Forest are included in the aerial surveillance. There are strong indications that this programme has been an effective deterrent to potential arsonists and careless people.

3.2.4 Fuel Breaks/Fire Breaks

The Department employs a system of fuel breaks, called fuel reduced buffers (FRBs) in its fire sensitive pine plantations (e.g. Blackwood Valley) in order to improve the success of initial attack and provide a measure of safety for fire fighters. Fuel reduction is achieved by grazing and fuel reduction burning, although some mechanical crushing of slash

debris has been tried. The FRBs are strategically located to maximize fire control advantage and minimize the potential fire loss area. Widths can vary from 100 to 400 metres. Grazing values are maintained by heavy thinning and high pruning, plus fertilizer applications. Establishment and maintenance of such fuel breaks is expensive and can only be justified for areas of high value and high risk.

3.2.5 Training

Since 1974, the Department has conducted one or two fire training schools each year for professional and field staff officers at basic, intermediate and advanced levels. Each week-long school is attended by about 60 F.D. staff plus invited personnel from other fire organizations and interstate forestry services.

3.2.6 Settlement Plans

The Forests Department plans and implements fire protection plans for permanent settlements and associated buildings within the forest. These protection programmes are compiled in conjunction with other government departments and organizations responsible for lands within and around each community centre. Treatments include special protective fuel reduction burning at regular frequencies, construction and maintenance of tracks and fire breaks, and removal of any exceptional hazards or risks.

3.3 Adequacy of Fire Prevention Measures

The present policy of fire prevention by way of fuel reduction burning, coupled with the advantages provided by the Department's aerial detection system, has proved effective in reducing the size and impact of wildfires.

Since 1961, when prescribed burning was given its greatest impetus following the disastrous Dwellingup and Karridale fires of that year, the incidence of large wildfires has been rare. There has been only one wildfire that exceeded 8000 ha, that being the Boorara fire of 1969 which burnt in heavy

fuels that had not yet been covered by the fuel reduction burning programme.

There have been ample opportunities for fire disasters in the past but for the benefits of fuel reduction burning. On these occasions (December 1974, February 1975, January/ February 1978), the Department faced more than 40 simultaneous fires burning under extreme weather conditions, but fire losses were not significantly high. The most significant test of the Department's fire organization effectiveness occurred during the fire emergency that arose in April 1978 when fires, although driven by cyclonic winds, burnt only 6800 ha of State Forest. Many fires were readily controlled because they burnt into recently fuel reduced areas.

3.4 Conclusions and Recommendations

Fuel reduction through prescribed burning or grazing will continue to be the cornerstone of the Department's effective fire control.

Aerial detection not only provides for rapid and accurate fire information on wildfire development and prescribed burn quality, but also provides an effective deterrent to arsonists and careless people.

Settlements plans containing effective measures for fire prevention and control are essential for all communities in and around forest areas.

Public education on the value and necessity of fire control, and the wise use of fire for land management is a constant and increasing demand that should be met at national, state and local fire control levels.

4. FIRE WEATHER SERVICE

4.1 Current Weather Forecast Service

The Forests Department has a high requirement for accurate and reliable weather forecasts for use in determining appropriate strategies and tactics during prescribed burning and fire suppression operations. Considerable additional costs for fire control and risks can result from inaccurate forecasts.

Prior to 1980 forecasts were supplied by the Bureau of Meteorology. The inability of the Bureau to provide sufficiently accurate forecasts on a 24-hour basis, led the Department to seek out an alternative service. Over the past three years the Department has contracted a private meteorological firm, Oceanroutes (Australia) Pty. Ltd., to provide reliable forecasts on a 24-hours, 7-days/week basis. Payment is based on the accuracy of forecasts and as a result, significant improvements have been achieved. A close working relationship has devloped with the forecast company, resulting in the forecasters gaining a greater appreciation of the Department's needs. Further improvements are still required and considered achievable.

4.2 Observation Network

Oceanroutes has access to Bureau of Meteorology data as well as both high and low resolution imagery from satellites. These data are supplemented by weather observations from the Forests Department's field station network, consisting of eight base stations at 50 to 70 km intervals.

Offshore data are obtained from forecast marine winds over the Indian Ocean, supplied to Oceanroutes by the

U.S. Navy from their computer facility at Monterey in California. These wind fields are used as input data for Oceanroutes' Indian Ocean spectral wave model.

Very little actual offshore observation data is available to the forecasters. There is a need for data from automatic weather recording buoys. However, these are expensive ($20,000 each) and have a limited life expectancy.

The lack of ocean data has lead to significant problems in forecasting the exact movement of fronts and troughs which can greatly affect fire danger.

Since 1981/82 season, weather observations and forecasts as well as fire danger indices, are distributed by computer network, replacing the radio and telephone system used previously. Routine updates, unschedules amendments and spot forecasts are distributed by the same means.

4.3 Funding of Specialized Service

The W.A.F.D. paid about $52,000 to Oceanroutes for routine and spot forecasts in 1982/83. Recent overtures to the Bureau of Meteorology indicated that owing ot severe staff restrictions, the Bureau was unable to provide the sort of specialized fire weather forecast service on a 24-hours, 7-day/week basis as provided by the private firm, and considered essential to the Department's fire operations.

4.4 Fire Weather Research

Some research of local weather patterns (e.g. local winds) and frontal movement has been carried out by Oceanroutes. A great deal more work is required in these areas, as well as on the occurrence and timing of trough movements.

4.5 Role of Forest Service

The Department recognized the need for improved understanding between forecasters and fire control officers. The secondment of fire weather forecasters from the Bureau of Meteorology to the Department could greatly improve this situation.

The Department has indicated its willingness to fund the Bureau of Meteorology in the past to assist in provision of extra staff for specialized fire weather service.

The Department already provides weather observation data for its existing network. It is also considering the establishment of extra automatic weather stations where these are likely to give improved input data.

4.6 Role of Bush Fires Board

The Bush Fires Board issues bans on burning off for Weather Zones throughout the State when the fire danger forecast issued by the Bureau of Meteorology for the Zone is Very High or Extreme. These fire danger indexes are based on the Grassland Danger Meter, not the Department's Forest Fire Danger Index.

4.7 Conclusions and Recommendations

A high level of weather forecast accuracy is critical in order to match prescribed burning prescriptions and fire suppression planning.

In order to improve weather forecasts, there is an apparent need for an increase in offshore buoys as well as forest based remote weather stations.

Whilst the F.D. has been prepared to contribute significantly to the funding for improved weather observations and forecast service, the Department would encourage a greater federal involvement and funding for W.A. and other states forest forecasts.

5. FIRE SUPPRESSION

5.1 Suppression Organization

The Department's fire suppression objective is to ensure rapid, effective attack of all wildfires within and directly threatening State Forest. To achieve this aim it has been necessary to develop a well-trained and well-equipped suppression organization capable of suppressing several simultaneous wildfires under severe summer conditions. The Department is to continue to work with other authorities and fire fighting organizations to ensure an effective, combined response in containing fires within State Forest and neighbouring lands.

5.1.1 Personnel Involved in Fire Control

The total number of Departmental staff and employees that can be made available for fire suppression emergencies is:

376 salaried officers
(excluding Mapping Branch and Clerical)

534 wages employees

Of these, the approximate number of staff directly involved in prescribed burning activities and low emergency fire suppression operations is:

181 salaried officers

300 wages employees

5.1.2 Organizational Structure

The fire control structure and distribution is as follows:

STRUCTURE OF FIRE CONTROL ORGANIZATION	LOCATION	PERSONNEL NOS.
DEPARTMENT CONTROL	SHQ (PROTECTION BRANCH)	12 SALARIED STAFF
REGIONAL CONTROL (NORTH, CENTRAL, SOUTH REGIONS	COMO) BUNBURY) MANJIMUP)	15 SALARIED STAFF
DIVISIONAL CONTROL SUPPLY FUNCTION INTELLIGENCE FUNCTION FIELD CONTROL SECTORS SECTORS CONTROL POINT GANGS GANGS	DIVISIONAL CENTRES In State-wide emergencies an additional 195 salaried officers and 234 employees are available to carry out support functions within the Large Fire Organization.	154 SALARIED STAFF 300 WAGES EMPLOYEES

5.1.3 Equipment Available for Fire Control

277 Light transport vehicles
111 Fire trucks (heavy duty pumpers and gang trucks)
60 Tractors
13 Bulldozers
140 Chainsaws
31 Fire lookout towers (5 active, 26 back-up)
9 Single engine aircraft for detection
2 Twin engine aircraft for aerial ignition
60 Radio telephones
461 Very High Frequency (VHF) radios
76 High Frequency (HF)

5.2 Suppression Strategy and Tactics

Fires detected within State Forest or within 3 km of State Forest are suppressed by local Divisional forces. Where rural lands are involved, local Fire Brigade forces and the Shire organizations are also called on to assist. The strategy and tactics adopted may vary with each different fire, but the organizational responses and communication links established follow those laid out in the Divisional Fire Control Working Plans.

In the case of fast-spreading fires (i.e. exceeding 140 m/hr) or multiple fires requiring more than three Divisional gang units, the Division sets up a Large Fire Organization (LFO) in which the control, intelligence, supply and line functions are automatically filled with trained staff and crews drawn from within and outside the Region (Regional LFO) or the Department (Dept. LFO). The roles and responsibility of all LFO personnel are laid out in the Foresters Fire Control Manual, as well as the handy Large Fire Organization booklet.

5.3 National Fire Fighting Resources

5.3.1 Large Air-Tankers

The use of large aerial retardant tankers is considered to be unsuitable in W.A. forests for the following reasons:

- flat terrain, easy access and broadscale fuel reduced areas mean that first attack fire containment by ground crews is likely to be at least as rapid and effective as by more expensive aerial tankers

- high standby charges and operational costs far outweigh any possible advantages over the current system based on dispersed ground suppression units.

The Department is awaiting with interest the developments on current research on practicality of air tankers by CSIRO under the Project Aquarius programme.

5.3.2 Infrared Surveillance

The use of infrared scanners for locating fire lines and hot spots in wildfires has good potential in Western Australia. The Department will be most interested in the results of operational trials on the infrared scanners being carried out by CSIRO scientists in conjunction with Project Aquarius.

5.3.3 Airborne Fire Fighters

The Department has frequently utilized charter aircraft to transport its own fire suppression crews between various centres in the south-west of the State during fire emergencies. Apart from these movements, however, no interstate transfers of fire crews have been considered. Personnel transport systems practised in the U.S.A. (e.g. Helitack, smoke jumping) are not considered necessary or practical for our gentle topography.

The possibility of increasing the utilization and effectiveness of pretrained Armed Forces in large fire emergencies has some merit and needs further investigation.

5.3.4 Fire Investigation

There are obvicus advantages in seeking the advice of interstate and international fire control experts whenever improvements in fire control systems are considered necessary, e.g. whenever large wildfire emergencies have found systems wanting. Such investigations normally have educational spin-offs for both parties and help provide an objective check against national/international standards.

5.3.5 Prescribed Burning

This Department has become recognized as the foremost practitioner of prescribed burning in the nation. In order for this knowledge and experience to be displayed effectively and rapidly to other States and organizations in Australia, a system of interstate exchange of senior fire control staff is considered essential.

5.3.6 Co-operation Between States

In the 1983/84 fire season, two Victorian Forests Commission officers will be exposed to W.A. Forests Department planning, preparations and aerial burning implementation procedures for several weeks of the burning period. This arrangement could be repeated and perhaps extended to include other States.

Apart from this arrangement co-operation already exists between Victoria and W.A forestry departments in respect to Advanced Fire Schools. One or two senior fire staff from these State Departments are nominated each year to travel interstate and exchange fire control ideas at week-long fire schools held by both States.

In another example of interstate co-operation, the W.A.F.D. has designed and constructed special incendiary machines for the Bush Fires Council of the Northern Territory for their aerial prescribed burning operations.

5.4 Conclusions and Recommendations

The Department recommends that research on the effective use of infrared scanners in fire detection be maintained and supported.

There appears to be little advantage in large aerial tankers for fire suppression in Western Australia, however the Department awaits the research findings of the Aquarius Project before making further recommendations.

The exchange of officers between State services to be encouraged to ensure a proper exchange of knowledge and experience in fire control.

Fire investigations between States provides a basis for objective examination of fire control issues including legal modifications, fire training and public education programmes, and improvement in fire control techniques.

6. BUSH FIRE RESEARCH

6.1 Personal Survival Techniques and Equipment

The W.A.F.D. places great emphasis on personal safety in all forest operations and in fire control operations in particular. It is considered that safety practices and procedures provide adequate safeguards for fire fighters. Survival tents are not seen as necessary or desirable except in some special situations where hand crews or dozer operators work in isolation.

6.2 Psychology of an Arsonist

The increasing incidence of "deliberately lit" fires in W.A. as well as in other States, requires that a positive prevention programme be developed to combat this serious source of wildfire. The development of such a programme must be based on a good understanding of the psychology of the arsonist. The study of this specialised subject could not be contemplated by State Departments alone, but would best be done at a national level by an external institution more suited to this type of investigation.

6.3 Fire Ecology

A great deal of fire ecology research has been carried out by the Department since the initial development of prescribed burning operations in Western Australia in 1954. Since that time research has continued on the short and long-term effects of fire on the major components of forest ecosystems including forest trees, understorey vegetation, macro and micro-fauna, soil values and water catchment values. The Department recognizes its responsibility to continue to research and monitor the effects of its policy of prescribed burning, to ensure that this practice is at all times compatible with the long-term welfare of the ecosystems

and the major land uses. One area requiring priority attention is the study of the impact of wildfire and prescribed burning regimes on soil nutrient status.

6.4 Fire Behaviour

A good understanding of fire behaviour in most forest fuel types exists. Current fire behaviour research is directed at increasing understanding of fire under dry fuel conditions; burning regimes for regrowth karri and jarrah stand and pine logging slash; and the behaviour of large-scale coalescing summer fires (Project Narrik/ Aquarius).

6.5 Fuel Properties

The understanding of fuel properties of the range of fuel types that exist in the major forest types of W.A. is considered adequate to provide for reliable predictions of fire behaviour in these fuels. Refinements of this knowledge, whilst desirable, are not considered of high priority.

6.6 Fire Control Technology

Operational research on fire technology and management is essential if changing fire protection demands are to be met. Technological advances are currently being sought in the following specific areas:

(a) Effective use of chemical fire retardants

(b) Use of mechanical and modified timber harvesting techniques to reduce fire hazards in pine plantations

(c) Fuel reduction and slash burning in plantations

(d) Aerial ignition of small areas and fuel reduction burning in pine plantations

(e) First attack units and large pumper units and trucks.

6.7 Infrared Technology, Satellite Imagery in Detection

There is a continuing need for the development of relatively inexpensive infrared detecting equipment for mapping of large fires and locating dangerous hot spots on fire lines. CSIRO (Division of Mineral Physics) is currently evaluating existing equipment and the results of these tests will be of interest to W.A.F.D.

There is considerable scope for the use of LANDSAT satellite images to provide information on fuel types and terrain conditions.

6.8 Stress on Fire Fighters

There is an important need to determine physical fitness and work capacities of fire fighters so that employees can be rated as fit for specific fire line duties. Appropriate fitness programmes to minimize physiological stress can be developed.

The physiology study of fire fighters by the Commonwealth Institute of Health, University of Sydney, conducted in W.A. in conjunction with Projects Aquarius and Narrik, must be encouraged and extended to include evaluation of work methods and protective clothing on physical efficiency of fire fighters.

6.9 Advanced Fire Modelling

The Department has computer programmes for "Fire Behaviour" and "Fire Suppression" models. The Fire Behaviour programme deals with the distribution and storage of weather forecasts, calculation of moisture content and predicted headfire rates of spread, for specified fuel types. This programme is now in operation.

"Fire Suppression" uses the Forest Management Information System (FMIS) to model fire spread dynamically and allows simulation of fire suppression strategy and tactic options.

The latter programme is still in the initial development stages and will require another 12-18 months input by 2 skilled persons before implementation in the field.

A third programme is currently under consideration which will provide managers with extra capabilities to integrate fire management into land-use planning and management activities. This is based on the U.S. Forest Service "FIRELAMP" model, which will be adapted for W.A. situations using the above-mentioned models.

6.10 Conclusions and Recommendations

The W.A. Forests Department considers the following research programmes as requiring highest priority for attention and funding:

Priority 1	Fire ecology and long-term effects of prescribed and wildfires on ecosystems and land-use values.
Priority 2	Stress on fire fighters - physical fitness programme.
Priority 3	Advanced fire modelling - computer programme development.
Priority 4	Fire control technology - use of aircraft, helicopters etc.

Many of the research subjects discussed require major input on a national level and involve organizations like CSIRO and tertiary institutions. It is critical that a balance be maintained between work and funding on fire suppression and fire prevention.

Recent bad fires in S.E. Australia have shown the need for a more positive approach to fuel reduction burning in these States. However, any expansion of this activity

requires background knowledge and technology in fire behaviour and fire effects. This is somewhat lacking for S.E. forests, where there has been no parallel research to that undertaken in W.A. in the past two decades. It may be necessary for CSIRO to take on the role of providing fire behaviour and fire effects data to allow state services to implement expanded prescribed burning programmes and appropriate fire regimes for forest management.

7. BUSH FIRE EDUCATION AND TRAINING

7.1 Fire Courses at Universities

No fire-related courses are taught at any W.A. institutions. On a national level the teaching of fire-related subjects constitutes only a small proportion of the existing forestry courses, and students are not exposed to any practical work with fire as part of their training. The Department is concerned that at present, no permanent staff at any Australian university has been appointed to teach fire science.

The fact that nearly all forest management decisions in Australia require consideration of fire protection and fire ecology, requires that fire science courses must be given a higher priority in the forestry curriculum.

7.2 Public Awareness Programmes

Public understanding of the role of fire in the Australian environment, and the need for fuel reduction burning and other fire prevention measures for the welfare of lives, property and forest lands, is lacking in the urban community in particular. The development of appropriate educational programmes, directed at higher levels of secondary education are regarded as important, as these students represent the most receptive and potentially most influential sector of the community. To this end, fire education kits including textbooks and video programmes, are needed as standard references and aids for such educational programmes.

7.3 Community Protection Programmes

The Department has a legal responsibility to prevent wildfire damage to life and community assets in the State Forest region. Apart from the fire prevention and suppression operations planned and implemented in the State Forest zones, the Department has entered into numerous agreements with other land authorities and fire organizations that cover private and Crown Lands adjoining the forest.

7.4 Safety Training and Physical Fitness

The Department has an outstanding safety record. This is a result of its commitment to the development of safety awareness amongst all its personnel, and the emphasis on training in safety procedures for all operations and fire control in particular. The Department's lost-time accidents have been reduced from a frequency rate (per 1,000,000 man-hours worked) of more than 100 in 1966/67 to only 14 in 1982/83.

The Department is concerned with the fitness of its fire fighters and in 1982/83 helped to sponsor a study on the physiological stress of fire fighters by Professor Budd, University of Sydney. Development of fitness programmes for its employees is under consideration.

7.5 Conclusion and Recommendations

Strong representation should be made to the Forestry Department at A.N.U. and Melbourne University to provide adequate permanent staff for teaching fire science subjects as an integral part of the forestry curriculum.

It is recommended that a comprehensive fire science (fire management, control and ecology) education programme be developed and promoted on a national scale, directed at high school and undergraduate students in particular.

Research into the physiological stress and fitness programmes for fire fighters should be encouraged.

There is a need to examine means by which large organizations can improve the physical fitness of their employees where necessary.

8. APPLICABILITY OF OVERSEAS FIRE FIGHTING ARRANGEMENTS TO AUSTRALIA

The Department strongly supports continuation of the U.S.A./ Australian interchange fire study tours sponsored by the Australian Forestry Council, the U.S. Forest Service and F.A.O. Considerable value has been derived in fire operations where U.S. technology and Australian methodology have resulted in significant mutual benefits, e.g. spotter aircraft and fire retardant use for Australia, and prescribed burning methods for the U.S.

Such group tours should also include Canadian Forest Service personnel and operations.

It is considered also that there would be benefits from exchange visits with other countries with similar fire climates, e.g. South Africa and Southern France.

9. OTHER TOPICS

9.1 National Fire Statistics

Standards and requirements for fire statistics vary widely between state forestry services, thus comparisons of fire data for analysis purposes (e.g. suppression costs) become a very difficult exercise and results are almost impossible to validate. The Department supports the recommendation of the Fire Control Officers - that a national standard of fire reports be developed and implemented in all States.

COPY OF SECTIONS OF FORESTS ACT AND FORESTS ACT REGULATIONS RELATING TO FIRE CONTROL

(41) Conferring on the holders of timber leases, concessions, and sawmill permits the right for a period not exceeding six months after the expiration of such leases, concessions, and permits to remove their buildings, machinery, plant, and effects, including timber acquired.

(42) Generally for carrying into effect the objects of this Act.

And may, by any such regulations, impose a penalty not exceeding two hundred dollars for any breach of the same, or for any contravention or failure to comply with any provision or condition contained in any permit, license, or authority granted in pursuance of this Act.

Provided that so far as such regulations apply to any existing concession, lease, or sawmill permit, such regulations shall not be inconsistent with the rights under such concession, lease, or permit.

44. [*Repealed by Act No. 43 of 1954, s. 11.*]

PART VII.—OFFENCES, AND GENERAL PROVISIONS.

Unlawful cutting, etc.
Amended by No. 43 of 1954, s. 12; No. 113 of 1965, s. 8.
See Land Act, 1898, s. 135. Vic. No. 2655, s. 52 (h). N.S.W. 1916, No. 55, s. 27.

45. Any person who, without lawful authority, fells, cuts, injures, destroys, obtains, or removes in, on, or from any State forest, timber reserve, or other Crown land any forest produce shall be guilty of a forest offence, and liable, on conviction, to imprisonment for not exceeding one year, or to a penalty not exceeding four hundred dollars.

Penalty for unlawfully lighting fires.
Amended by No. 43 of 1954, s. 13; No. 113 of 1965, s. 8.
See Vic., No. 2655, s. 34.

46. (1) If any person—

(a) lights, kindles, or assists to light or kindle, or aids or abets another person in lighting or kindling, any fire within the boundaries or within twenty yards of any boundary of a State forest or timber reserve; or

(b) leaves, without taking due precaution against its spreading or causing injury, a fire lighted or kindled by him as aforesaid, or in the lighting or kindling of which he has aided or abetted;

and in either case any forest produce is burnt or injured, or is in danger of being burnt or injured, such person shall be guilty of a forest offence, and liable, on conviction, to imprisonment for not exceeding one year, or to a penalty not exceeding four hundred dollars.

(2) A reward of not exceeding one hundred dollars may be paid by the department to any person, not being a forest officer, who shall give such information as may lead to a conviction under this section.

A forest officer may call for assistance to extinguish fires.

47. (1) In the event of a fire occurring in or adjacent to any State forest or timber reserve, a forest officer may call upon any person residing or working within a radius of five miles of the outbreak to assist in extinguishing the fire.

(2) All persons who in response to such call shall render the assistance required shall be remunerated at the prescribed rate.

Setting fire to bush or grass without notice to forest officer.

48. Any person who sets fire in the open air to any tree, wood, bush or grass on any land contiguous to a State forest or timber reserve, without giving notice of his intention to a forest officer so as to allow such officer to be present at the firing, commits a forest offence.

Unlawful occupation of forest land.
See N.S.W., 1916, No. 55, s. 32.

49. Any person who, in any State forest or timber reserve, except in pursuance of a permit, license, or forest lease under this Act, or of a grant, lease, license, or other authority from the Crown,—

(a) depastures any cattle;

122. Where it appears to the Conservator that a permit holder or licensee, either by himself or his employees, is—

(a) causing damage to growing trees or other forest produce;

(b) not utilising trees felled or other forest produce obtained to the best advantage;

(c) causing waste of timber in felling operations by felling trees at too great a height above ground level;

the Conservator may require payment by the permit holder or licensee of a sum equal to the estimated value of the damage to such trees or other forest produce, or of the loss on the timber or other forest produce wasted, and the amount so required to be paid may be recovered by the Conservator from the permit holder or licensee by action in any court of competent jurisdiction.

123. A timber worker or other person causing damage to growing trees or other forest produce, or not utilising trees felled or other forest produce obtained to the best advantage, or who in felling operations causes waste of timber by felling trees at too great a height above the ground level, shall be guilty of a forest offence.

124. No person shall fell, cut, split, or obtain timber, whether growing or dead, on any reserve set apart for settlers' requirements, except under written permit from the Conservator.

125. No person shall burn any standing tree.

126. The cutting or removal of kurrajong, quandong, red flowering gum baobab *(Adansonia Gregorii)*, and Christmas trees and *Livistona Alfredi, Livistona Eastoni* and cycad palms of every kind or size is absolutely prohibited throughout the State.

127. [*Revoked by G.G. 22/10/70, p. 3256.*]

128. The despatching to any place outside the State of any karri timber with an end section exceeding 24 square inches, whether that timber is sawn, hewn or in the form of round logs, is prohibited, unless that timber is distinctly branded to the satisfaction of the Conservator with the letter "K". Reg. 128. Substituted by *G.G.* 22/10/70, p. 3256.

129. No person shall hinder or obstruct any officer of the Department in the performance of his duties, and on the breach of this regulation by any permit holder or licensee in addition to the penalty thereby incurred, his permit or license may be revoked.

130. A person desiring to obtain particulars as to names of permit holders, conditions and terms of permit agreements, or any other particulars affecting the same, may, on payment of the fee prescribed in the Third Schedule to these regulations, obtain the required information.

131. Fees shall be payable in respect of the several matters set out in the Third Schedule, according to the scale therein prescribed.

132. It is unlawful for any person to carry or use firearms within any State Forest or Timber Reserve, except with the written consent of the Conservator.

Fire.

133. Any person who without reasonable cause refuses or neglects to assist in extinguishing a fire when called upon by a forest officer so to do, under section 47 of the Act, shall be guilty of an offence and shall be liable on conviction to a penalty not exceeding forty dollars.

134. Any person who, when called upon by a forest officer under section 47 of the Act, renders the assistance required in extinguishing a fire, shall be remunerated for his services at the rate provided for under the Arbitration Court Award between the Australian Workers' Union, Westralian Branch Forestry Workers Industrial Union of Workers, and the Conservator as from time to time in force.

135. [*Revoked by G.G. 22/10/70, p. 3256.*]

136. (1) No person shall trespass within any fenced-off area surrounding any fire look-out tower or fire look-out tree.

(2) No person shall destroy, cut into, deface or in any way damage any fire look-out tower or fire look-out tree, or, without due authority, climb any such tower or tree.

(3) Any person who commits a breach of subregulation (1) or (2) of this regulation shall be liable to a penalty not exceeding one hundred dollars ($100).

Spark Arresters.

137. [*Revoked by G.G. 22/10/70, p. 3256.*]

138. [*Revoked by G.G. 22/10/70, p. 3256.*]

139. [*Revoked by G.G. 22/10/70, p. 3256.*]

140. (1) A Sawmilling Permit issued under the Act is held subject to the conditions that the owner thereof shall—

(a) equip the sawmill erected on the site described in the schedule to the permit with efficient fire-fighting equipment and appliances including an instrument or device to be used as a fire alarm;

(b) maintain at all times the fire-fighting equipment and appliances in good working order and condition and efficiently train a team of men to work such equipment and appliances;

(c) ensure that a sufficient supply of water is available at the site of the sawmill in order efficiently to work the fire-fighting equipment and appliances;

(d) keep the mill cleared of all loose debris, bark, sawdust or other material whatsoever of such a nature as to be likely to increase the risk of fire;

(e) not burn (except within incinerators approved by the Department, any debris, bark, sawdust or other material whatsoever at any place within one and a half chains from the nearest part of the sawmill;

(f) arrange periodic inspections of the sawmill during the non-working hours for the purpose of preventing if possible any outbreak of fire in the sawmill;

(g) immediately after operations in the sawmill cease on each working day, damp down by spraying with water the interior of the sawmill and an area having a perimeter of ten feet from the sawmill.

But where the Conservator considers any of the foregoing precautions are impracticable, he may provide for alternative precautions to be taken.

(2) For the purpose of this regulation any equipment or appliances to be used for firefighting and approved by the Department shall be deemed to be efficient fire-fighting equipment and appliances.

Penalties.

141. (1) A person who commits a breach of any of the foregoing regulations, or who contravenes or fails to comply with any provision or condition contained in any permit, license or authority granted in pursuance of the Act, commits an offence and shall, for every offence for which a penalty is not otherwise specially provided by the Act or these regulations, be liable to a penalty of not exceeding two hundred dollars ($200).

(2) The minimum pecuniary penalty for any forest offence shall be one-twentieth of the maximum, and no court shall have power to reduce such minimum.

Appointments and Promotions of Officers to the General Division.

142. Appointments and promotions of officers to the general division shall be subject to the passing of such examinations as may be conducted by the Conservator from time to time. Reg. 142. Substituted by *G.G.* 22/10/70, p. 3256.

143. [*Revoked by G.G. 22/10/70, p. 3256.*]

144. [*Revoked by G.G. 22/10/70, p. 3256.*]

145. [*Revoked by G.G. 22/10/70, p. 3256.*]

146. An officer, on successfully passing the prescribed examinations and tests shall be listed as eligible for promotion as suitable vacancies occur, subject to good and diligent conduct and capacity to take responsibility and handle men to the extent required in any vacant position.

147. [*Revoked by G.G. 22/10/70, p. 3256.*]

FIRST SCHEDULE.

Form No. 1. Reg 33. Form 1. Amended by *G.G.* 29/4/58, p. 776.

Forests Act, 1918.

SAWMILLING PERMIT.

No.....

THIS permit to fell, cut, and remove each month during the currency hereof on and from the area described in the Schedule and delineated in the plan attached hereto, a quantity of..... log timber not exceeding..... cubic feet measured in the round for conversion into sawn timber, is granted to..... ..... of.....(hereinafter referred to as the "permit holder"), under and subject to the conditions hereinafter expressed.

1. Subject to the payment of the royalty hereby reserved and the observance and performance by the permit holder of the conditions hereinafter expressed, and of the provisions of the Forests Act, 1918, and the amendments thereof and the regulations thereunder and in force for the time being, so far as such provisions and regulations are applicable hereto, this permit shall continue in force from the.....day of.....19....., until the.....day of.....19....., unless suspended or forfeited and cancelled in the meantime.

2. The permit holder shall pay to the Conservator of Forests (hereinafter called "the Conservator"), at the office of the Forests Department, Perth, the royalty of..... .....for each and every cubic foot of .....log timber measured in the round obtained under this permit, and such royalty shall be payable forthwith as accounts are rendered from time to time by or on behalf of the Conservator to the permit holder: Provided that, if payment

EXTRACT FROM FORESTERS MANUAL, FIRE CONTROL SECTION, PARA 9.043 "STANDARD FOR PRESCRIBED BURNING"

Prescribed burning of large areas on a rotational system. The length of rotation will depend primarily on the rate of fuel build-up together with seasonal weather, manpower availability and other local circumstances.

Advance burning - prior to logging operations.

Slash burning, for regeneration or hazard reduction, following logging operations.

Burning under pine canopy for the purpose of subdividing extensive plantation areas to minimise loss in the event of wildfires.

Areas to be protected

9.041 Except for those areas where specific approval for burning has been obtained from Head Office, complete protection will be afforded to:

- Pine and hardwood plantations.
- Karri tops or scrub-rolled areas being held for regeneration burning and areas programmed for cutting within three years
- Regenerated karri areas where crop saplings are less than 15 m tall.
- Regenerated jarrah areas where crop saplings are less than 6 m tall.
- Areas required for research and investigation.

ROTATIONAL PRESCRIBED BURNING

Master plans

9.042 Area O.I.C.'s must draw up prescribed burning master plans. These plans will show:

Hardwood areas which will be burnt as buffer areas.

Hardwood areas for prescribed burning on a rotational basis for protection of timber, flora, fauna or recreational values. Rotation length should depend on the average rate of fine fuel accumulation for each forest type, unless defined management objectives dictate otherwise for a particular area. As our suppression organisation can be expected to handle wildfires in fuels up to eight tonnes/ha in jarrah fuel types and up to 19 tonnes/ha in karri fuels, this should generally be used as the criterion to decide rotation length.

The prescribed conditions for burning an individual area will be decided by the primary land use objective for that area. Where timber values and preservation of flora and fauna are paramount, the following limits will apply:

Standard for prescribed burning

9.043 (a) Management Priority Areas and other areas where primary land use requires mild prescribed burning.

Jarrah Forest:

Burning cover in the range 60 to 80% with minimal crown scorch to crop or potential crop trees.

Karri Forest :

Burning cover in the range 60 to 80%. Up to 10% scorch in small clumps or individual crop trees.

Flats :

Burning under mild conditions only to give a mosaic pattern with 40 to 60% cover.

Poor Quality Forest :

Burning cover in the range 40 to 60% carried out under mild conditions.

(b) Wherever possible, planning must aim to use aerial ignition techniques and be designed for aircraft ignition.

(c) Where more intense fires are specified for management objectives, the desired fire intensity and level of acceptable crown damage must be defined in the prescription.

Annual burning plan and notification to Protection Branch

The area O.I.C. shall draw up a current burning plan each year setting out the proposed programme. He should also ensure that enviromental conditions can be met by completing FD 713 for each job.

All hardwood burning (hand and aerial) proposals are to be shown on a 1:50,000 plan with job numbers and areas. These plans will be used to provide :

(a) Detail to the Department of Agriculture for the benefit of beekeepers.

(b) Protection Branch with records.

(c) Mapping Branch with necessary information for the preparation of flight plans.

These will be submitted, after vetting, by the Regional Protection Officer and the Regional Leader, to the O.I.C. of Protection Branch by the following dates:

Hardwood - 15 May

Plantation - 15 March

Prescription and preparation for burns in hardwood forest susceptible to dieback disease must be completed before 1 March, during the dry summer months, to maximise hygiene.

Prescriptions to be prepared for all burns

9.043 A prescription is to be prepared for all burns whether hand, aerial, karri regeneration or clearing burns. Job specifications have been prepared describing the methods of fuel sampling and proper recording for the prescription form, i.e.:

FD 655 for hardwood

FD 574 for burning under pine canopy

FD 657 for clearing or regeneration burns

Where applicable, burning prescriptions are to include constraints on vehicle movements and wash-down to prevent the spread of dieback. These specifications should cover each phase of the operation, i.e.:

Preparation of boundary roads

Edge burning

Main burn and mop-up

Prescription to ensure protection from damage

9.044 When the inspection and prescription are being prepared for each prescribed burn, every object, operation or establishment within the area which may suffer damage must be identified and action taken to ensure protection. The position of anything liable to be damaged must be recorded on the inspection form so that protection is not overlooked, see PAFSOU and Environmental Check List forms.

Bush Operations

Identify the precise location of sawlog, pole and firewood operations and relate them to prescribed burning plans. Advise the operators of burning to be carried out near the site of their operations or on their access routes. Plan and take precautions to avoid damage from the prescribed burn or from "hop-overs".

Dieback quarantine area

9.045 In dieback quarantine areas road preparation will be restricted to log removal and slashing or brushing litter from spatially safe road surfaces. No grading is to be carried out in these areas without the written approval of the Regional Superintendent.

Type of burning prescription

9.046 The fire intensities prescribed for each area will be determined by the primary land use objective for that area. Normal prescribed burning will be carried out in the FDI range of up to 40 metres per hour (m/hr).

The application of more intense fires for special management objectives (e.g. regeneration of Acacia thickets for dieback control) may be prescribed after vetting by The Regional Protection Office and Regional Leader.

Hardwood prescriptions

9.047 Prescriptions for hardwood burning will be based on 1:25,000 scale API plans.

Preparation of hardwood prescriptions should follow guidelines set out below:

Use the API plan for separating each job into similar forest types based on species, height and density.

Examine cutting records to determine top disposal requirements, sapling age, likely height of regeneration and changes to canopy density since aerial photography. In karri forest proposed cutting will be noted. Where top disposal cleaning is necessary it is to be shown in the prescription and works programme.

Records of past burning will be used to identify the number of leaf falls since the last burn and whether it was patchy or clean.

From the number of leaf falls and canopy density, fuel quantities are estimated from fuel accumulation tables.

Inspect sufficient check points to confirm the predictions of fuel type and weight, and height of potential crop tree regeneration. Record scrub type, density and height. Techniques for assessing fuel quantity are available from fire research. Note topography.

See job specifications "Measurement of Forest Fuels".

The prescription must nominate the fire danger index and number of lightings for each job.

Number of lightings will be decided from range of forest types and fuel quantities in the area. Where fuel quantity range is sufficient to introduce a variation in FDI of 10 m/hr or more, two lightings should be prescribed. The fire danger index prescribed for any one lighting should be within a range of 5 m/hr.

As a guideline:

Flats should be burnt at FDI	11 to 16 m/hr
Saplings over 5 m in height	12 to 17 m/hr
Poles and mature trees	20 to 25 m/hr
Mature trees	30 to 35 m/hr

Environmental controls to be observed

9.048 The area O.I.C. is to ensure prescribed burning conforms with required enviromental standards, i.e.:

Strips fronting onto major tourist routes and surrounding tourist attractions are not burnt during the main floral display of the wildflower season.

Prescribed burns, and particularly aerial burns, in the vicinity of major towns or airstrips, should not be carried out unless weather conditions are suitable for proper smoke dispersal, and the Department's smoke prediction services consulted to ensure heavy fuel accumulations do not occur in key areas.

Appropriate warning signs must be set up without fail where smoke is likely to impair visibility for road traffic through forest area.

Burning on water catchments

Large-scale aerial burning of the slopes adjacent to holding dams and reservoirs for MWSSDB may result in contamination of stored water by ash, particularly when water levels are low. Clearance for any such burn should be obtained from the O.I.C. Protection Branch before they are implemented.

Fauna habitat

For fauna refuges it is important that swamps are patch burnt and left in an uneven-aged condition. Patch burning of swamps can normally be achieved early in spring, providing special lightings are not undertaken later in the season to ensure they burn out. Special burning of swamps should be avoided unless they pose problems in perimeter control.

Records of prescribed burning

9.049 The area O.I.C. is to ensure proper records of prescribed burning are maintained.

Overseers or officers directly in charge of burning operations must daily mark on the plan in the Divisional office the area considered to have been burnt. These areas will not be finally 'washed in' on the Divisional burning plan until they have been inspected and burn quality verified.

A summary of burning is to be prepared on a weekly basis during the restricted season. This summary is to be forwarded to O.I.C. Protection Branch at 1100 hours each Monday morning, or the first working day for the week. The summary is to show:

Progressive total area of hand burning for season (ha).

Progressive total area of aerial burning for season (ha).

Burning plans must be updated daily during the restricted season to show progress of burning by settlers or other organisations in land adjoining forest estate.

LIST OF 1982/83 INTERAGENCY BURNING AGREEMENTS

APPENDIX 1.

F.D. INTERAGENCY AND RECOUP WORKS IN 1981/82 AND 1982/83 SEASONS

List Prepared by N. Bukells 4/7/83

AME OF AGENCY	LOCATION AND TYPE OF WORK	PERIOD AND TERMS	OUTCOME	REMARKS
ATIONAL PARKS	P/B 4 areas: Warren NP 200 ha, Beedelup 100 ha, Mitchell 44 ha and Brockman 25 ha.	1981/82 One I/A form for all 4 jobs, but recoup arranged for Warren only. RWO 108, estim. $4500.	Warren completed, charged $2236. Other 3 areas were linked to FD burns but not charged for. Probably all completed.	Cyclic burning plan is on fil FC 26 and dated 24/7/80.
RMY	P/B part of Bindoon Training Area, 1800 ha.	1981/82 burning season. Form 731 plus RWO 106. Quoted $400.	Completed. $4360 recoup.	
.W.D.	P/B Govt. Land in Collie.	Spring 82. RWO 107. Estimated $321. I/A not necessary.	Completed. Charged $554.	
USH FIRES BOARD	Augusta-Marg. River 84 ha Loc. 4391. Eastern extension of FD burn B 19.	1981/82 burning season, I/A form and RWO 110. FD to ignite and patrol. Estimated recoup $108.	Aborted, FD unable to undertake the burn.	
USH FIRES BOARD	Denbarker 10 - 7500 ha Aerial P/B	Autumn 82.		
USH FIRES BOARD	Denbarker 15 - 7460 ha Aerial P/B	Spring 81.		
USH FIRES BOARD	Denbarker 16 - 7800 ha Aerial P/B	Spring 81.	Requested by B.F.B., but no formal agreement made due to FD financial constraints. Some areas were probably burnt without I/A arrangements.	
USH FIRES BOARD	Denbarker 17 - 10650 ha Aerial P/B	Autumn 82.		
USH FIRES BOARD	Denbarker 18 - 12594 ha Aerial P/B	Autumn 82.		
USH FIRES BOARD	Lupton Block - 3000 ha Aerial P/B	Autumn 82. RWO 111. Estimated $1360	Completed. Recoup $1099.	
USH FIRES BOARD	Lake Jasper VCL Loc 12900 abt. 2000 ha. Aerial Burn Nannup 51.	Autumn 82. I/A form for previous season used again for 81/82. RWO 112. Estimated $1960.	Completed. Cost recoup was $1638.	
USH FIRES BOARD	Hand burn areas of VCL adjoining Collie townsite.	81/82 RWO 113. Estimated $600. I/A form hardly necessary, but made out in July 79 on a perennial basis.	Completed. Charged $2228.	
USH FIRES BOARD	Strip of Crown Land & SF adjoining Caves Road.	Autumn 83. I/A form only. No recoup.		Plan with I/A on FC 26 dated 16/4/82
USH FIRES BOARD	Manjimup District Fire Protection Plan. P/B VCL SW of Northcliffe (Aeroburns).	Autumn 83. I/A signed 19/7/82.		No other data
USH FIRES BOARD	Firebreak maintenance on VCL adjoining Collie townsite. No burning.	1982/83 RWO 117. I/A form not required.	Completed, cost was $338.	
ISHERIES & ILDLIFE & BFB	P/B F & F Reserve 24472 adj. SF 16.	1982/83 I/A form signed 20/8/82.		No other data.
ORSLEY TIMBER CO.	P/B 1500 ha Loc 51 between Beela Road and SF. Aerial burn.	1981/82 RWO 109. Estimated $1233. Unlikely that I/A form was used or needed.	Completed. $1376 recoup.	
ORSLEY TIMBER CO.	P/B 3 portions of Loc 56, total 1680 ha. Hand and aerial.	1982/83 RWO 114. Quoted $3025. I/A form not necessary.	Completed, charged $3787	

....2

APPENDIX 1. (continued)

NAME OF AGENCY	LOCATION AND TYPE OF WORK	PERIOD AND TERMS	OUTCOME	REMARKS
ALCOA	Jarrahdale, Huntley, Del Park and Willowdale minesites.	I/A exists but not found on Prot. file. Apparently the work being done annually since 1981/82.		
NATIONAL PARKS	Aerial burn Walpole Block abt. 400 ha (Mt. Clare area).	82/83 I/A form only. No recoup involved. FD expenditure not to exceed $800.		Cyclic burn plan on FC 26, with I/A of 11/2/82.
DEPT. OF MINES	P/B Explosives Storage Res. 30 400 Manjimup townsite.	1982/83 I/A form, plus RWO 115. Estimate $900.	Completed, charged $1350.	
P.W.D.	P/B Govt. land in Collie.	1982/83 RWO 116. No quote or estimate. I/A form not necessary.	Completed, cost was $1716. Payment via L.P.O.	
BUSH FIRES BOARD	Denbarker Fire Prot. Plan No. 1, VCL, SF & TRs. East of Nornalup Road.	I/A signed 22/3/83 and valid "until further notice. Review by 1986").		
BUSH FIRES BOARD	Denbarker Fire Protection Plan No. 2. West of Nornalup Rd.	As above.		
RAAF & BFB	P/B portions of Pearce Air Weapons Range.	I/A drawn up April 82 believe not yet signed and no further info at Prot. Branch SHQ.		3-year cyclic plan on FC 26 tog. with draft I/A date 6/4/82.
WORSLEY ALUMINA	P/B along Conveyor Belt from Mt. Saddleback to Worsley Refinery.	Agreement not yet finalized. Worsley were advised in writing on 26/6/83 that we will present a draft in 2 or 3 weeks.		Draft of I/A is on FC 26.
NATIONAL PARKS	Boranup Location 3434 Nat. Pk.	1983/84 aeroburn integral with adjacent SF. Costs 50/50. I/A signed 12/4/83. No RWO as yet.		Cyclic plan to 1986/87 is on file FC 26.

NOTE: Last 5 items scheduled 1983/84.

NB:vh 6/7/83