FIRE RESEARCH PROGRAMME

- PROGRAMME PLAN -

1. PREAMBLE

This Programme Plan stemmed from a meeting of Programme members held at Woodvale on 11/12/86. We decided <u>not</u> to describe the *modus operandi* of the Fire Research Programme, including such activities as research extension, publications, liaison, communication, co-operation and the need to ensure that research is applied in its nature, etc. We believe that these aspects should be dealt with in the Research Division Plan. They are, therefore implicit in the following Programme Plan.

2. MISSION STATEMENT

2.1 To develop a scientifically based understanding of fire behaviour and fire suppression techniques to enable managers to safely implement prescribed fires to achieve defined goals and to facilitate the control of wildfires.

2.2 To understand the role of fire in maintaining ecological processes as a basis for predicting short and long term effects of fire regimes on the biota.

2.3 To develop integrated fire behaviour, fire suppression and fire effects predictive systems to facilitate effective land use planning and management.

3. PRIMARY OBJECTIVES

3.1 To develop a State wide Fire Danger Rating System.

3.2 To develop fire behaviour prediction models for major vegetation types throughout the State.

3.3 To develop fuel characteristic models for major vegetation types throughout the State.

3.4 To develop a systematic approach to defining fire hazard.

3.5 To develop an understanding of fire related weather conditions throughout the State.

3.6 To assist with the development of operational guidelines for wildfire detection, pre-suppression and suppression techniques and to evaluate their effectiveness and impact on the environment.

3.7 To develop and implement a system for comprehensive reporting and archiving of fire occurrence on CALM lands throughout the State.

3.8 To determine the short and long term effects of fire regimes on various plant and animal communities.

3.9 To examine how fire regimes alter the structure and composition of natural habitats and thus affects relationships between fauna and habitat.

3.10 To examine the influence of fire on demographic patterns of selected plants and animals.

3.11 To document and study the effects of fire on Rare Flora and to prepare relevant management guidelines.

3.12 To identify critical plant and animal species or communities which may be readily monitored and used as biological indicators of pyric status and environmental conditions.

3.13 To develop simple field techniques for use by operational staff for assessing fuels and pyric status.

3.14 To develop computer based management systems which integrate fire behaviour, fire suppression, fire effects and other relevant resource information for a range of biomes.

3.15 To develop and implement a monitoring programme for evaluating the effects of fire on CALM lands throughout the State.

4. PAST AND CURRENT ALLOCATION OF RESEARCH RESOURCES.

Fire research covers many disciplines and biogeographical boundaries. The following matrix (Table 1) summarises the past and current level of research input by Primary Objective categories (or by subject matter) and by vegetation type. We have taken the liberty of adapting and condensing Beard's (1979) physiognomic classification as described below;

1. Forest (includes jarrah, marri, karri and pine plantation).
2. Woodland (wandoo, tuart, york gum, salmon gum etc.).
3. Low Shrubland (heath-northern sandplains, south coastal).
4. Low Woodland (mulga).
5. Banksia Woodland.
6. Savanna Woodlands (mainly northern Kimberleys).
7. Tall Shrublands (pindan, acacia).
8. Hummock Grasslands (spinifex).
9. Succulent Steppe (saltbush, bluebush etc.).

Table 1 is an indication of the level of well designed and implemented scientific research which has/is being undertaken by CALM in the major vegetation types of W.A. In some cases, research work may have been conducted by other organisations. It is clear from Table 1 that it is only in the Forest areas that the level of fire research activity is approaching adequate. It is also clear that future fire research in the forest areas should concentrate on fire effects on plants and animals and on the development of computer based management systems which integrate fire behaviour, fire suppression and fire effects.

TABLE 1: Estimated levels of Fire Research effort on various CALM lands over the past five years and by Primary Objectives.

LEGEND: 0 = No effort
1 = Very low effort
2 = Low effort
3 = Moderate effort

PRIMARY OBJECTIVE	VEGETATION TYPE								
	FORESTS	WOODLAND (Wheatbelt)	LOW SHRUBLAND (Heath)	LOW WOODLAND (Mulga)	BANKSIA WOODLAND	SAVANNA WOODLAND (Kimberley)	TALL SHRUBLAND (Pindan)	HUMMOCK GRASSLAND (Spinifex)	SUCCULENT STEPPE (Saltbush)
3.1 FIRE DANGER RATING SYSTEM	2	0	0	0	1	0	0	0	0
3.2 FIRE BEHAVIOUR PREDICTION SYSTEM	3	0	0	0	1	0	0	0	0
3.3 FUEL MODEL	3	1	1	0	1	0	0	0	0
3.4 DEFINING FIRE HAZARD	1	0	0	0	0	0	0	0	0
3.5 KNOWLEDGE OF FIRE WEATHER	2	0	0	0	1	0	0	0	0
3.6 WILDFIRE SUPPRESSION TECHNIQUES	2	0	0	0	1	0	0	0	0
3.7 REPORTING AND ARCHIVING FIRE OCCURRENCE	2	0	0	0	1	0	0	0	0
3.8 SHORT AND LONG TERM FIRE EFFECTS	3	2	2	0	0	0	0	1	0
3.9 FIRE REGIME EFFECTS ON HABITAT	2	2	2	0	0	0	0	1	0
3.10 FIRE EFFECTS ON DEMOGRAPHIC PATTERNS OF PLANTS AND ANIMALS	2	2	1	0	0	0	0	1	0
3.11 RARE FLORA AND EFFECTS OF FIRE	1	1	1	0	0	0	0	0	0
3.12 CRITICAL PLANT AND ANIMAL BIOLOGICAL INDICATORS	1	2	2	0	0	0	0	0	0
3.13 SIMPLE FIELD ASSESSMENT TECHNIQUES	2	1	1	0	1	0	0	0	0
3.14 COMPUTER FIRE MANAGEMENT SYSTEMS	2	2	0	0	0	0	0	0	0
3.15 MONITORING PROGRAM	1	1	1	0	0	0	0	1	1

5. RESEARCH OBJECTIVES - THE NEXT 5 YEARS AND THE NEXT 20 YEARS

Where and how the limited fire research resources are directed in the next 5 years is not entirely up to the Fire Programme members to decide. Such decisions need to be made after consultation with other Divisions and Regional and District Staff.

A State-of-Art Review of fire research in Western Australia will be undertaken by the Fire Programme members. The review will aim to;

i. Summarise and document existing knowledge.

ii. Identify gaps in knowledge and set fire research priorities.

The favoured strategy for directing Fire Research Programme resources is to deal with each major vegetation type completely. That is, to conduct simultaneous and complimentary research into all aspects of fire management relevant to that type, culminating in an integrated management system. This will not always be practical but is desirable. We will never have sufficient resources to conduct the type of research in all major vegetation type simultaneously.

The Low Shrublands (heaths) have been identified as the most important areas requiring fire behaviour/suppression research effort. However, other fragile vegeation types such as spinifex, mulga and savannah woodlands desperately require research into both fire behaviour and fire effects. To simultaneously study these areas in the short term (5 to 10 years) would require double the resources of the existing Fire Program. This is most unlikely to occur. Tables 2 and 3 are estimates of future fire research direction with existing resources. These tables are a simplification of and serve only to indicate the general direction of fire research as best one can estimate at this time.

TABLE 2: Status of Research Goals in the next five years

LEGEND: 0 = No effort
1 = Studies to commence
2 = Studies to continue
3 = Studies complete

PRIMARY OBJECTIVE	VEGETATION TYPE								
	FORESTS	WOODLAND (Wheatbelt)	LOW SHRUBLAND (Heath)	LOW WOODLAND (Mulga)	BANKSIA WOODLAND	SAVANNA WOODLAND (Kimberley)	TALL SHRUBLAND (Pindan)	HUMMOCK GRASSLAND (Spinifex)	SUCCULENT STEPPE (Saltbush)
3.1 FIRE DANGER RATING SYSTEM	3	1	1	0	3	0	0	1	0
3.2 FIRE BEHAVIOUR PREDICTION SYSTEM	3	1	1	0	3	0	0	1	0
3.3 FUEL MODEL	3	2	2	0	3	0	0	1	0
3.4 DEFINING FIRE HAZARD	3	1	0	0	0	0	0	1	0
3.5 KNOWLEDGE OF FIRE WEATHER	3	1	1	0	0	0	0	1	0
3.6 WILDFIRE SUPPRESSION TECHNIQUES	3	1	1	0	0	0	0	0	6
3.7 REPORTING AND ARCHIVING FIRE OCCURRENCE	2	1	1	0	2	0	0	1	0
3.8 SHORT AND LONG TERM FIRE EFFECTS	2	2	2	0	0	0	0	2	0
3.9 FIRE REGIME EFFECTS ON HABITAT	2	2	2	0	0	0	0	2	0
3.10 FIRE EFFECTS ON DEMOGRAPHIC PATTERNS OF PLANTS AND ANIMALS	2	2	2	0	0	0	0	2	0
3.11 RARE FLORA AND EFFECTS OF FIRE	2	2	2	0	0	0	0	1	0
3.12 CRITICAL PLANT AND ANIMAL BIOLOGICAL INDICATORS	2	2	2	0	0	0	0	1	0
3.13 SIMPLE FIELD ASSESSMENT TECHNIQUES	2	2	2	0	3	0	0	1	0
3.14 COMPUTER FIRE MANAGEMENT SYSTEMS	2	2	0	0	0	0	0	1	0
3.15 MONITORING PROGRAM	2	2	2	0	0	0	0	1	0

TABLE 3: Status of Research Goals in the next twenty years.
LEGEND: 0 = No effort
1 = Studies to commence
2 = Studies to continue
3 = Studies complete

PRIMARY OBJECTIVE	VEGETATION TYPE								
	FORESTS	WOODLAND (Wheatbelt)	LOW SHRUBLAND (Heath)	LOW WOODLAND (Mulga)	BANKSIA WOODLAND	SAVANNA WOODLAND (Kimberley)	TALL SHRUBLAND (Pindan)	HUMMOCK GRASSLAND (Spinifex)	SUCCULENT STEPPE (Saltbush)
3.1 FIRE DANGER RATING SYSTEM	3	3	3	1	3	1	1	3	0
3.2 FIRE BEHAVIOUR PREDICTION SYSTEM	3	3	3	1	3	1	1	3	0
3.3 FUEL MODEL	3	3	3	1	3	1	1	3	0
3.4 DEFINING FIRE HAZARD	3	3	3	1	0	1	1	3	0
3.5 KNOWLEDGE OF FIRE WEATHER	3	3	3	1	0	1	1	3	0
3.6 WILDFIRE SUPPRESSION TECHNIQUES	3	3	3	1	0	1	1	3	0
3.7 REPORTING AND ARCHIVING FIRE OCCURRENCE	3	3	3	1	3	1	1	3	0
3.8 SHORT AND LONG TERM FIRE EFFECTS	2	2	2	1	0	1	1	2	0
3.9 FIRE REGIME EFFECTS ON HABITAT	2	2	2	1	0	1	1	2	0
3.10 FIRE EFFECTS ON DEMOGRAPHIC PATTERNS OF PLANTS AND ANIMALS	2	2	2	1	0	1	1	2	0
3.11 RARE FLORA AND EFFECTS OF FIRE	2	2	2	1	0	1	1	2	0
3.12 CRITICAL PLANT AND ANIMAL BIOLOGICAL INDICATORS	2	2	2	1	0	1	1	2	0
3.13 SIMPLE FIELD ASSESSMENT TECHNIQUES	3	2	2	1	3	1	1	2	0
3.14 COMPUTER FIRE MANAGEMENT SYSTEMS	3	2	2	1	0	1	1	2	0
3.15 MONITORING PROGRAM	2	2	2	1	0	1	1	2	0

6. CURRENT RESEARCH PROJECTS

1. Slash Burning Guides for *P. radiata* Plantations RWP #
2. The Mount Soil Dryness Index for Use in W.A. RWP #
3. Forest Fire Effects Study RWP #
4. Forest Fire Behaviour Under Dry Fuel Conditions RWP #28/78
5. Identifying and Describing Biotic Fire Descriptors RWP #
6. The Combustion Rate of Forest Fuels RWP #18/86
7. The Development of Spot Fires in the Forest RWP #69/86
8. Documenting Wildfire History - Forests RWP #68/86
9. Prescribed Fire to Control Pine Wildings RWP #16/86
10. Rate of Fuel Accumulation in Banksia Woodlands RWP #17/86
11. A Computer Based Wildfire Information Storage and Retrieval System RWP #15/86
12. Fire-Caused Injury to Jarrah and Marri RWP #
13. The Effect of Fire on *Lambertia rariflora* RWP #
14. Fire in Regenerated Karri Stands RWP #
15. Aspects of Wildfire Behaviour in Banksia Woodlands RWP #
16. Pitfall Trapping - Sampling Methodology.
17. Fire Ecology - Tutanning Area.
18. Fire Ecology - Kellerberrin Area.
19. Fire Ecology - Perup Area.
20. Niche Relationships of Small Lizards.
21. Spatial Dynamics of Lizards and Scales for Sampling.
22. Ecological Data Base for Herpetofauna.
23. Traditional Aboriginal Burning.
24. Arid Zone Fire Behaviour.
25. Impact of Fire Regimes on Desert Biota.
26. Arid Zone Aerial Burning and Its Monitoring.
27. Fire and the Tammar Wallaby RWP #7/84.

28. Fire, Season and Termite Activity RWP #8/84.

29. Long Term Population Fluctuations of the Woylie RWP #2/83.

30. Fire Effects Studies - Two Peoples Bay Nature Reserve.

31. Fire Effects Studies - Tutanning Nature Reserve.

32. Fire Effects Studies - Kellerberrin Area.

33. Fire Effects Study - Middle Island.

34. Fire Effects Study - Mt Lesueur.

35. Describing Fuels in Kwongan - Tutanning.

7. HUMAN AND FINANCIAL RESOURCES (Excluding salaries, admin, costs etc.) Budget estimates are for 1987/88.

Manjimup Station

	WAGES	PLANT	MATERIALS	TOTAL
Neil Burrows (RS)	530	2850	7375	10755
Lachlan McCaw (RS)	530	2850	7145	10525
Robert Smith (TA)				
Bruce Ward (TA)				
John Neal (TA)				
Karan Maisey (TA)				
Alex Robinson (TA)				
Woodvale Station				
Dr Angus Hopkins (RS)	1750	7950	13500	23200
Dr Gordon Friend (RS)	-	7200	9500	16700
Judith Brown (TA)				
David Mitchell (TA)				
Kalgoorlie				
David Pearson (RS)	-	8200	10000	18200
Dan Grace (TA)				
TOTAL	2810	29050	47520	79380

Neil Burrows
Fire Program Leader