

Fire Management Branch
Department of Conservation & Environment

A SUMMARY OF
FOREST FIRE STATISTICS,
1972-73 TO 1980-81

RESEARCH REPORT NO. 12
R. RAWSON, B. REES
MARCH 1982

FOREWORD

The introduction of a computer-based system of recording fire data has allowed a much more comprehensive analysis of forest fire statistics for Victoria than has previously been possible. This report gives the results of some analyses for the period 1972-73 to 1980-81.

The analyses presented are those that it was considered would provide an overview of the forest fire problem at both the State and Divisional level. As the computer data base continues to expand, further analysis will be possible.



S F DUNCAN

Chief Division of Forest Protection

LIST OF TABLES

1 General Statistics

Table 1: Number of fires and areas burnt by Divisions.	6
2: Area burnt by land status.	6

2 Fire Origins

Table 3: Number of fires by land status at origin.	6
4: Area burnt (%) by origin for land status categories.	7
5: Number of fires (%) by land status at origin for Divisions.	7
6: Area burnt (%) by land status at origin for Divisions.	7

3 Monthly Distribution

Table 7: Monthly distribution of fire number (%) for Divisions.	8
8: Monthly distribution of area burnt (%) for Divisions.	8

4 Cause

Table 9: Number of fires (%) by cause (source) for Divisions.	9
10: Number of fires (%) by cause (agency) for Divisions.	10
11: Area burnt (%) by cause (source) for Divisions.	11
12: Area burnt (%) by cause (agency) for Divisions.	12
13: Number of fires (%) by cause (source) for land status at origin.	13
14: Number of fires (%) by cause (agency) for land status at origin.	14

5 Detection/Suppression

Table 15: Number of fires (%) by detection methods for Divisions.	15
16: Number of fires (%) by first attack agency for Divisions.	15
17: Number of fires (%) by first attack agency for land status at origin.	16

18: Number of fires (%) with CFA involvement for Divisions.	16
19 Number of fires (%) by first attack methods.	16
6 <u>Fire Area Classes</u>	
Table 20: Number of fires (%) by area classes for Divisions.	16

INTRODUCTION

This report presents the results from some analyses of fire data for the 9 years 1972/73 to 1980/81. The intention in conducting the analyses was to more clearly define the nature of the forest fire problem in Victoria at both the State and Divisional level, and to provide a sound basis for protection planning.

METHOD

Many of the data describing fires attended by the FCV from 1972/73 to 1980/81 are now on computer file within the Government Computing Service Burroughs system. The data were analysed using both the facilities available on SPSS¹ and specially written FORTRAN programs.

Only fires that originated in, or burnt into, the Fire Protected Area (FPA) were included (i.e. fires with Land Status codes² 1 to 8), and the areas burnt refer only to areas burnt within the FPA. The results presented will therefore differ slightly from those which would be obtained from analysis of fire statistics presented in Annual Reports for the period. Statistics in these reports, up to and including the 1974/75 fire season, include information on all fires attended by the FCV whether inside or outside the FPA.

Data for the years 1972/73 to 1977/78 were obtained by coding information taken from fire reports prepared under the old format. In some instances complete information could not be obtained and therefore not all fires in the computer file were available for each analysis. The numbers of fires on which each analysis was based are shown in the table headings.

-
- 1 N H Nie et al (1975) SPSS - Statistical package for the social sciences. 2nd Edition. McGraw-Hill.
 - 2 Division of Forest Protection (1981) Instructions for completing Form 338B - Final Fire Report, Part 1.

RESULTS AND DISCUSSION

A detailed discussion of the results of the analyses has not been attempted here. This section provides a brief summary of the nature of the forest fire problem in Victoria while more detailed information can, when required, be obtained from the tables which are appended.

1 General Statistics (Tables 1 and 2)

In the 9 year period there were 4196 fires which burnt 964225 hectares within the FPA. The greatest number of fires (19.8%) occurred in Eastern Division and the least number (9.1%) in Central Division. The greatest area burnt (60.3%) was in Western Division and the least (0.4%) in Northern Division. Much of the area burnt in Western Division was in the semi-arid regions of the Big Desert and Sunset Country. Of the total area 86.5% was State Forest (SF), 7.5% National Park (NP), 3.6% private property (PP), 1.7% Protected Public Land (PPL) and 0.7% other classes of public land (OPL).

2 Fire Origins (Tables 3 to 6)

Most fires (57.1%) originated in SF and these were responsible for burning 81.2% of the total area. 30.5% of fires originated in PP (both inside and outside the FPA) and burnt 14.6% of the area, with the 4.6% of fires which originated in NP burning 3.5% of area. The remaining 7.8% of fires, which originated in either PPL or OPL, burnt only 0.7% of the total area.

Fires which originated in all classes of public land were responsible for burning 15216 hectares or 44.3% of the total area of PP burnt within the FPA. Conversely, fires which originated in PP burnt 122248 hectares or 13.1% of the total area of public land.

3 Monthly Distribution (Tables 7 and 8)

The distribution of the number of fires by month of origin peaked for the State at 22.9% during January. However, both Eastern and Southern Divisions also have earlier peaks with 17.4% and 11.7% of fires respectively originating during September. The importance of fires in early spring in these Divisions in particular is emphasised by the statistics relating to the monthly distribution of area burnt. Of the total areas burnt in Eastern and Southern Divisions, 48.9% and 60.8% respectively were burnt by fires which originated in September.

Statistics of the area burnt by fire originating in the summer months showed a big variation. In December and January 21.7% and 23.9% respectively of the total was burnt but this dropped dramatically to only 4.7% in February. In fact, more area was burnt by fires originating in each month of spring than by those originating during February.

4 Cause (Tables 9 to 14)

Lightning was the greatest single cause of fire throughout the State being responsible for 23.9% of all fires. On a Divisional basis it ranged from 35.8% of fires for Eastern Division to 6.7% for Northern Division. When viewed in terms of area burnt lightning becomes even more important, with 60.3% of the total area being burnt by lightning caused fires and ranging from 1.6% in Northern Division to 85.2% in Western Division.

Deliberate lighting with malicious intent was the next most important source with 17.7% of fires in the State and 10.6% of the total area burnt. It is a consistent source of fire in all Divisions ranging from 11.0% of fires in North Eastern Division to 33.1% in Central Division.

The groups of people (agencies) responsible for most forest fires were farmers and/or farm employees (10.6% of number and 10.8% of area), other local residents (6.9% and 1.0%) and recreationists (10.0% and 0.7%). Escapes from departmental burning operations accounted for 2.7% of all fires and 4.4% of the total area burnt.

5 Detection/Supression (Tables 15 to 19)

The FCV system of fire lookouts discovered 33.3% of fires, landowners/residents 24.0% and FCV employees 13.6%. Only 2.8% of fires were discovered by FCV-hired patrol aircraft.

The FCV was the first attack agency on 57.7%, and the CFA on 31.3%, of fires which originated in or affected the FPA. The importance of the CFA as a first attack agency varied substantially between Divisions from 8.5% of fires in Eastern Division to 53.4% of fires in Northern Division. The CFA were in attendance at 51.3% of fires which burnt within the FPA.

Tankers were used in first attack on 74.2% of fires, handtools on 50.6% and machines (dozers) on 19.2%. Aerial attack using long-term fire retardant was only used on 1.0% of fires.

6 Fire Area Classes (Table 20)

For the State 62.9% of fires were controlled at areas from 0-1 hectare. Western Division with 50.8% had the lowest proportion of fires controlled at this size while Central Division with 74.8% had the highest. Only 2.6% of fires in the State exceeded 1000 hectares.

APPENDIX

TABLES 1 - 20

The following abbreviations have been used in table construction.

1 Land Status

SF = State forest
 NP = National park
 PPL = Protected public land
 OPL = Other public land
 PP = Private property
 PP (IN) = Private property within the Fire Protected Area
 PP (OUT) = Private property outside the Fire Protected Area

2 Divisions

C = Central
 E = Eastern
 N = Northern
 NE = North Eastern
 S = Southern
 SW = South Western
 W = Western

3 Agencies

FCV = Forests Commission Victoria
 CFA = Country Fire Authority
 NPS = National Parks Service
 SEC = State Electricity Commission
 MMBW = Melbourne and Metropolitan Board of Works

- 4 A dash (-) has been used to indicate when there was no record for a classification. Zero has been used where a record for the classification occurred but was less than 0.05%.

TABLE 1 NUMBER OF FIRES AND AREAS BURNT BY DIVISIONS
(4196 FIRES)

DIVISION	NUMBER OF FIRES		AREAS		YEARLY MEANS	
	NO.	%	HA.	%	NO.	HA.
C	381	9.1	5585	0.6	42	621
E	830	19.8	241995	25.1	92	26888
N	481	11.5	3522	0.4	53	391
NE	580	13.8	52374	5.4	64	5819
S	520	12.4	59387	6.1	58	6599
SW	736	17.5	19842	2.1	82	2205
W	668	15.9	581520	60.3	74	64613
STATE	4196	100.0	964225	100.0	465	107136

TABLE 2 AREAS BURNT BY LAND STATUS
(4196 FIRES)

LAND STATUS	TOTAL AREAS		YEARLY MEAN
	HA.	%	HA.
SF	834298	86.5	92700
NP	72795	7.5	8088
PFL	16121	1.7	1791
OPL	6663	0.7	740
PP(IN)	34348	3.6	3817
STATE	964225	100.0	107136

TABLE 3 NUMBER OF FIRES BY LAND STATUS AT ORIGIN
(4196 FIRES)

LAND STATUS (ORIGIN)	NUMBER OF FIRES		YEARLY MEAN NO.
	NO.	%	
SF	2398	57.1	266
NP	193	4.6	21
PFL	40	1.0	4
OPL	286	6.8	32
PP(IN)	1137	27.1	126
PP(OUT)	142	3.4	16
STATE	4196	100.0	465

TABLE 4 AREAS BURNT(%) BY ORIGIN FOR LAND STATUS CATEGORIES
(4196 FIRES)

LAND STATUS (ORIGIN)	STATE	SF	NP	PPL	OPL	PP(IN)
SF	81.2	87.4	34.9	68.8	43.0	41.4
NP	3.5	1.2	32.1	-	-	0.2
PPL	0.2	0.1	-	8.2	0.0	0.0
OPL	0.5	0.1	0.0	0.1	40.6	2.7
PP(IN)	8.2	6.5	6.9	16.1	6.1	49.5
PP(OUT)	6.4	4.7	26.1	6.8	10.3	6.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 5 NUMBER OF FIRES(%) BY LAND STATUS AT ORIGIN FOR DIVISIONS
(4196 FIRES)

[illegible]

TABLE 6 AREA BURNT(%) BY LAND STATUS AT ORIGIN FOR DIVISIONS
(4196 FIRES)

[illegible]

[illegible]

TABLE 10 NUMBER OF FIRES(%) BY CAUSE(AGENCY) FOR DIVISIONS
(4195 FIRES)

AGENCY	STATE	C	E	DIVISION				S	SW	W
				N	NE					
LIGHTNING	23.9	14.4	35.8	6.7	34.5	33.8	8.4	26.8		
CHILDREN	3.5	8.1	1.0	8.1	2.6	0.4	4.6	2.8		
EMPLOYEE-FOREST INDUSTRY	2.3	1.8	3.0	1.0	2.8	1.5	2.9	2.4		
EMPLOYEE-FOREST DEPARTMENT	2.7	4.5	4.7	0.8	2.1	3.5	1.2	1.9		
EMPLOYEE-OTHER DEPARTMENT	1.5	1.3	1.4	1.3	2.1	1.3	1.5	1.6		
EMPLOYEE-OTHER INDUSTRY	1.0	1.3	0.6	0.8	0.9	1.9	1.2	0.7		
RECREATIONIST-BUSHWALKER	0.3	0.3	0.1	0.2	-	1.2	0.5	-		
RECREATIONIST-CAMPER	3.0	1.0	1.1	6.0	3.8	2.9	2.0	4.8		
RECREATIONIST-FISHERMAN/SHOOTER	3.3	1.0	1.8	9.0	1.7	1.3	2.9	5.5		
RECREATIONIST-DAY VISITOR	3.4	2.1	1.3	6.7	2.4	1.3	6.4	3.7		
RESIDENT-PERMANENT	4.8	5.5	2.3	3.1	6.9	3.7	8.2	4.0		
RESIDENT-PART TIME	2.1	5.2	0.5	2.7	1.6	2.5	3.3	1.0		
FARMER/FARM EMPLOYEE-FULL TIME	8.6	5.8	9.3	4.6	9.3	10.6	6.5	12.4		
FARMER/FARM EMPLOYEE-PART TIME	2.0	2.9	2.2	0.6	2.1	1.0	3.4	1.6		
MILITARY	0.3	0.3	-	1.3	-	0.4	0.3	-		
TRAVELLER	2.6	2.9	1.6	4.4	2.9	1.7	2.2	3.0		
GRAZING LEASEHOLDER	0.7	-	2.8	0.2	-	-	0.4	0.4		
OTHER	6.8	6.8	4.8	6.7	5.3	5.2	11.5	6.7		
UNKNOWN	27.2	34.8	25.7	35.8	19.0	25.8	32.3	20.7		
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		

TABLE 11 AREA BURNT(%) BY CAUSE(SOURCE) FOR DIVISIONS
(4196 FIRES)

SOURCE	STATE	C	E	DIVISION					S	SW	W
				N	NE						
LIGHTNING	60.3	3.6	23.0	1.6	39.6	13.0	9.7	85.2			
EXHAUST-CHAINSAW	0.0	0.0	0.1	0.0	0.0	-	0.0	0.0			
EXHAUST-OTHER	0.9	1.0	0.0	0.9	0.2	0.0	2.1	1.4			
SMOKING-HAULING	0.0	0.0	-	-	0.0	-	-	-			
BURNING VEHICLE-MACHINE	1.1	0.7	0.0	0.5	0.0	0.4	0.0	1.7			
PIPE-CIGARETTE-MATCH	0.1	0.1	0.1	4.9	0.3	0.0	0.2	0.0			
CAMPFIRE-BARBECUE	0.4	4.7	0.6	19.0	0.3	1.0	3.4	0.1			
PREScribed BURNING-DEPARTMENTAL	4.0	39.3	5.7	0.0	8.6	28.5	0.0	0.2			
BURNING OFF-RAILWAY	0.0	-	0.0	0.0	-	-	0.2	-			
BURNING OFF-STUBBLE-GRASS-SCRUB	3.9	21.2	4.2	1.2	0.4	26.7	3.1	1.6			
BURNING OFF-WINDROW-HEAP	2.9	1.4	3.4	4.6	4.5	1.5	0.3	2.8			
TRAIN	0.0	-	0.0	5.0	0.0	0.0	1.3	0.0			
DELIBERATE LIGHTING-MALICIOUS	10.6	15.9	29.4	12.8	1.8	7.0	21.3	3.5			
WASTE DISPOSAL-DOMESTIC	0.2	0.0	0.0	0.1	0.0	0.0	0.8	0.3			
WASTE DISPOSAL-INDUSTRIAL	0.1	0.0	0.4	1.8	0.0	0.0	0.1	0.0			
SAWMILL-TIP											
POWER TRANSMISSION	1.2	0.1	0.0	1.2	16.4	0.1	0.3	0.5			
HOUSE-STOVE-FLUE	0.2	0.8	0.0	-	0.0	0.0	10.5	0.0			
BURNING BUILDING	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6			
FIREWORKS	0.0	0.0	-	0.0	0.0	-	-	-			
RELIGHT-WILDFIRE	0.2	0.0	0.6	0.0	-	-	0.0	0.2			
RELIGHT-PREScribed FIRE	3.1	0.6	10.6	0.4	0.1	0.2	16.2	0.1			
RELIGHT-BURNING OFF	6.4	4.0	19.4	0.8	0.4	11.0	5.4	1.1			
OTHER	1.1	2.6	0.6	37.0	2.7	5.1	0.6	0.5			
UNKNOWN	2.9	4.0	1.9	8.2	24.7	5.5	24.3	0.2			
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			

TABLE 12 AREA BURNT(%) BY CAUSE(AGENCY) FOR DIVISIONS
(4195 FIRES)

AGENCY	STATE	C	E	DIVISION					SW	W
				N	NE	S				
LIGHTNING	60.3	3.6	23.0	1.6	39.6	13.0			9.7	85.2
CHILDREN	0.0	0.1	0.0	1.3	0.0	0.0			0.2	0.0
EMPLOYEE-FOREST INDUSTRY	2.6	0.0	5.4	1.0	1.9	7.9			14.8	0.5
EMPLOYEE-FOREST DEPARTMENT	4.4	40.5	6.2	0.3	8.5	25.3			16.2	0.4
EMPLOYEE-OTHER DEPARTMENT	3.1	8.6	10.1	5.1	3.9	3.4			0.2	0.1
EMPLOYEE-OTHER INDUSTRY	0.1	1.1	0.0	0.3	0.0	1.6			0.1	0.0
RECREATIONIST-BUSHWALKER	0.3	0.0	0.2	0.0	...	3.8			0.0	...
RECREATIONIST-CAMPER	0.2	0.6	0.0	4.7	0.4	2.3			2.2	0.0
RECREATIONIST-FISHERMAN-SHOOTER	0.1	3.7	0.0	10.0	0.1	0.4			0.3	0.0
RECREATIONIST-DAY VISITOR	0.1	1.2	0.2	1.5	0.1	0.0			0.9	0.0
RESIDENT-PERMANENT	0.8	1.6	0.1	1.0	0.6	0.5			1.3	1.1
RESIDENT-PART TIME	0.2	14.6	0.0	0.8	0.0	0.1			0.8	0.1
FARMER-FARM EMPLOYEE-FULL TIME	10.4	3.3	19.3	39.1	1.5	19.3			14.8	6.3
FARMER-FARM EMPLOYEE-PART TIME	0.4	3.8	0.9	0.1	0.2	0.1			1.0	0.3
MILITARY	0.0	0.0	...	0.2	...	0.3			0.0	...
TRAVELLER	0.4	0.1	0.1	0.2	0.0	0.2			2.7	0.5
GRAZING LEASEHOLDER	1.5	...	5.6	0.0			0.2	0.1
OTHER	3.2	1.0	0.9	3.5	16.9	0.4			6.2	3.1
UNKNOWN	11.9	16.2	28.0	29.3	26.3	21.4			28.4	2.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0			100.0	100.0

TABLE 13 NUMBER OF FIRES(Z) BY CAUSE(SOURCE) FOR LAND STATUS AT ORIGIN
(4196 FIRES)

SOURCE	STATE	SF	LAND STATUS(ORIGIN)				
			NP	PPL	OPL	PP	
LIGHTNING	23.9	33.0	24.9	17.5	3.5	11.4	
EXHAUST-CHAINSAW	0.4	0.4	-	-	-	0.5	
EXHAUST-OTHER	1.6	0.9	-	2.5	2.5	2.8	
SNIGGING-HAULING	0.0	0.0	-	-	-	0.1	
BURNING VEHICLE-MACHINE	1.4	1.0	2.1	2.5	4.6	1.2	
PIPE-CIGARETTE-MATCH	6.9	7.6	5.2	5.0	10.5	5.2	
CAMPFIRE-BARBEQUE	8.1	10.1	7.8	10.0	7.0	4.6	
PRESCRIBED BURNING--DEPARTMENTAL	1.3	2.0	1.6	-	-	0.2	
BURNING OFF-RAILWAY	0.1	-	-	-	0.7	0.2	
BURNING OFF-STUBBLE-GRASS--SCRUB	5.8	2.5	1.0	2.5	4.9	13.1	
BURNING OFF-WINDROW-HEAP	4.6	1.2	0.5	2.5	1.7	12.3	
TRAIN	0.5	0.1	-	-	4.2	0.5	
DELIBERATE LIGHTING-MALICIOUS	17.7	20.6	48.2	40.0	16.8	7.2	
WASTE DISPOSAL--DOMESTIC	1.4	0.8	0.5	-	4.2	2.1	
WASTE DISPOSAL--INDUSTRIAL	2.5	1.5	-	-	14.0	2.2	
-SAWMILL-TIP							
POWER TRANSMISSION	1.8	0.8	0.5	2.5	2.1	3.6	
HOUSE-STOVE-FLUE	0.7	0.0	-	-	-	2.1	
BURNING BUILDING	0.5	0.2	-	-	-	1.2	
FIREWORKS	0.1	0.2	-	-	-	0.1	
RELIGHT-WILDFIRE	0.4	0.4	-	-	0.7	0.5	
RELIGHT-PRESCRIBED FIRE	1.2	1.8	-	-	0.3	0.6	
RELIGHT-BURNING OFF	5.2	2.4	0.5	-	4.5	11.5	
OTHER	4.5	2.8	2.6	7.5	5.6	7.7	
UNKNOWN	9.4	9.7	4.6	7.5	12.2	9.1	
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	

TABLE 14 NUMBER OF FIRES(%) BY CAUSE(AGENCY) FOR LAND STATUS AT ORIGIN
(4195 FIRES)

AGENCY	STATE	SF	LAND STATUS(ORIGIN)			
			NP	PPL	OPL	PP
LIGHTNING	23.9	33.0	24.9	17.5	3.5	11.4
CHILDREN	3.5	2.7	12.4	5.0	4.5	3.4
EMPLOYEE-FOREST INDUSTRY	2.3	2.5	-	-	0.7	2.8
EMPLOYEE-FOREST DEPARTMENT	2.7	4.2	1.0	-	1.0	0.5
EMPLOYEE-OTHER DEPARTMENT	1.5	0.8	3.6	-	8.4	1.0
EMPLOYEE-OTHER INDUSTRY	1.0	0.8	-	2.5	1.4	1.4
RECREATIONIST-EUSHWALKER	0.3	0.3	1.6	2.5	0.3	-
RECREATIONIST-CAMPER	3.0	3.7	2.6	5.0	4.2	1.5
RECREATIONIST-FISHERMAN/SHOOTER	3.3	4.0	1.6	7.5	0.7	2.7
RECREATIONIST-DAY VISITOR	3.4	4.1	6.7	-	5.9	1.3
RESIDENT-PERMANENT	4.8	2.1	-	-	8.0	10.0
RESIDENT-PART TIME	2.1	0.6	-	2.5	0.7	5.7
FARMER/FARM EMPLOYEE-FULL TIME	8.6	2.7	1.6	-	2.4	22.4
FARMER/FARM EMPLOYEE-PART TIME	2.0	0.5	-	2.5	0.3	5.6
MILITARY	0.3	0.4	-	2.5	-	-
TRAVELLER	2.6	2.1	1.6	2.5	9.8	1.9
GRAZING LEASEHOLDER	0.7	1.1	0.5	-	0.7	0.1
OTHER	6.8	4.2	3.6	7.5	12.9	10.8
UNKNOWN	27.2	30.2	38.3	42.5	34.6	17.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 15 NUMBER OF FIRES(%) BY DETECTION METHOD FOR DIVISIONS
(2548 FIRES)

[illegible]

TABLE 16 NUMBER OF FIRES(%) BY FIRST ATTACK AGENCY FOR DIVISIONS
(2548 FIRES)

[illegible]

TABLE 17 NUMBER OF FIRES(%) BY FIRST ATTACK AGENCY
FOR LAND STATUS AT ORIGIN (2548 FIRES)

[illegible]

TABLE 18 NUMBER OF FIRES(%) WITH CFA INVOLVEMENT FOR DIVISIONS
(4017 FIRES)

STATE	DIVISION						
	C	E	N	NE	S	SW	W
51.3	63.5	22.4	71.6	52.5	35.7	66.1	59.1

TABLE 19 NUMBER OF FIRES BY FIRST ATTACK METHODS
(2625 FIRES)

METHOD	NO	%
GROUND ATTACK-HANDTOOLS	1327	50.6
GROUND ATTACK-TANKER	1949	74.2
GROUND ATTACK-MACHINE	505	19.2
GROUND ATTACK-PUMP + HOSE	121	4.6
AERIAL ATTACK-RETARDANT	26	1.0

TABLE 20 NUMBER OF FIRES(%) BY AREA CLASSES FOR DIVISIONS
(4196 FIRES)

[illegible]