

# Contents

Preface	ix	Types of fire	38
List of contributors	xi	Dynamics of extreme fires	45
<b>1 In the beginning</b>	<b>1</b>	Scales of fire impact: smoke	50
The nature of fire	2	<b>4 Fire in the wild landscape</b>	<b>54</b>
Just how widespread are forest fires?	4	Causes of wildfire – how do they start?	54
<b>2 Historical review</b>	<b>8</b>	What starts most fires?	62
The earliest beginnings of fire in geological time	8	Which burns most area?	65
Tertiary and Quaternary – the last 65 million years	11	The fire behaviour triangle	65
Holocene – the last 10 000 years	11	Fuel considerations: fires are what they consume	66
The intervention of humans	13	The effect of climate and weather	72
Uses of fire	13	Fire season	78
Control of fire – careful or careless?	15	Variability in how a fire spreads	78
Effect of aboriginal people on the landscape	16	The complexity of fire spread	81
Arrival of the Europeans	18	Patterns/mosaics on the landscape	82
Bambi and Smokey Bear	20	Patterns of fire over time	82
Reduced fire frequencies	21	Reconstructing fire history	85
Fire control to fire management	22	Fire size – how big is big?	88
Are fire frequencies increasing again?	24	<b>5 Fire ecology</b>	<b>90</b>
<b>3 How a fire burns</b>	<b>26</b>	How plants survive a surface fire	90
Mechanics of fire	26	Fire stimulation of flowering	97
Pre-ignition	26	Ground fires and plant survival	98
Ignition	28	How plants cope with a crown fire	98
Combustion	28	Sneaking past – invasion after a fire	110
Heat transfer	31	Combining these strategies	112
Variation in fuel quality	32	Bacteria and fungi	112
Temperature and energy	35	Animals and fire	112
Anatomy of a fire	37	Post-fire recovery of plants and animals	118

## 6 The benefits of fire and its use as a landscape tool 119

*with Peter Hobson*

- Fire and biodiversity – an overview 119
- Unpicking the factors that affect biodiversity 124
- Environmental legacies: dead wood and biodiversity 131
- Fire, forests and conservation 132
- Can clear-cutting replace fire? 135
- The future for fire-prone forests: environmental uncertainty, macroecology and ecosystem resilience 137
- Fire as a management tool in the landscape 141
- Fire and soils 142
- The wildland–urban interface (WUI) 143
- The role of prescribed burning in wildland–urban interface areas 145

## 7 Fire suppression 149

- Preliminary steps – fire intelligence 149
- Step 1: fire detection 154
- Step 2: dispatch 160

- Resources for fire suppression 163
- Step 3: suppression 167
- Step 4: suppression failure – large fire management 176
- Fatality fires 178
- The fire-management organisation 180

## 8 Wildland fire and its management – a look towards the future 183

*by Kelvin Hirsch*

- The age of uncertainty 183
- Trends and supertrends 185
- Adaptation 199
- Innovation 201
- The future – ours for the making 208
- Further reading 211
- References used in the text 212
- Index 223