EU-Australia GEO-SAFE think-tank

A short history of GIS and risk mapping in Victoria, Australia

Mark Garvey AFSM

RMIT, November, 2016

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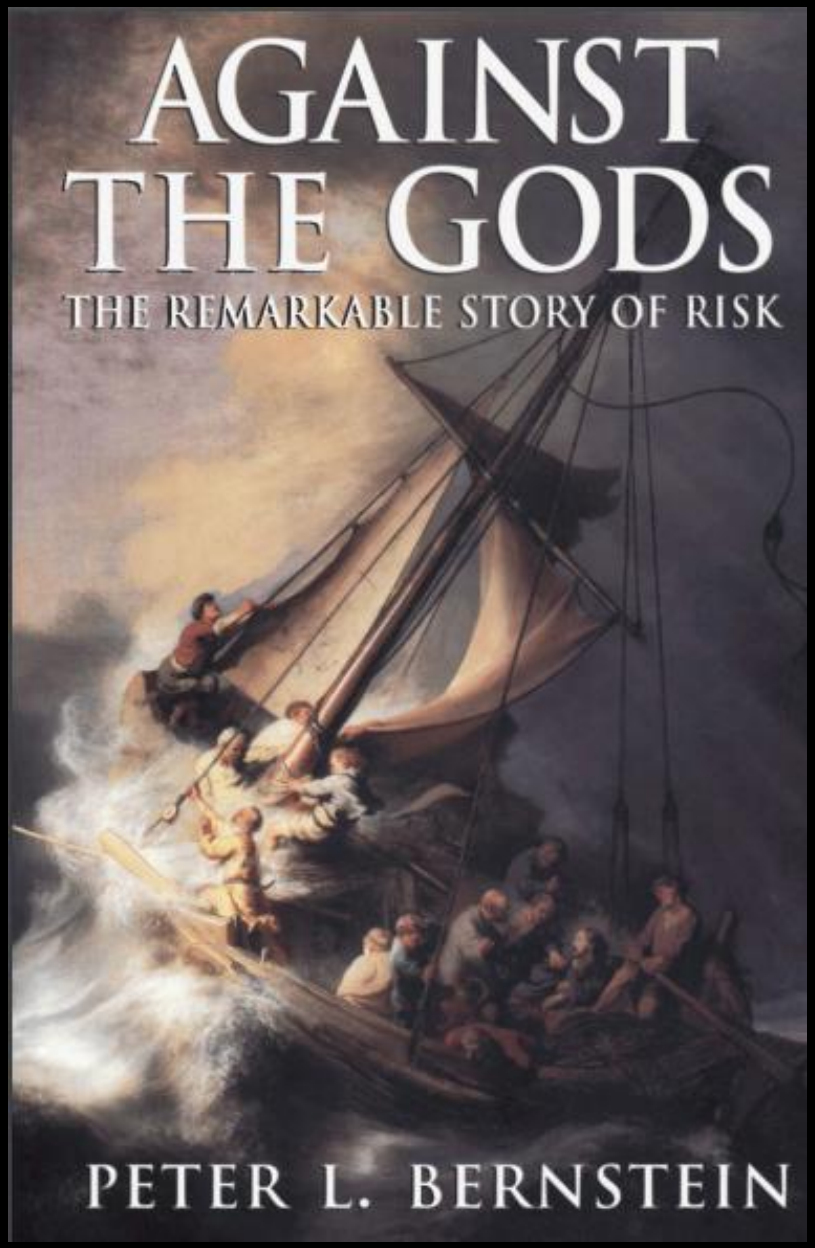

Risk theory as we know it is only a three or four hundred years old

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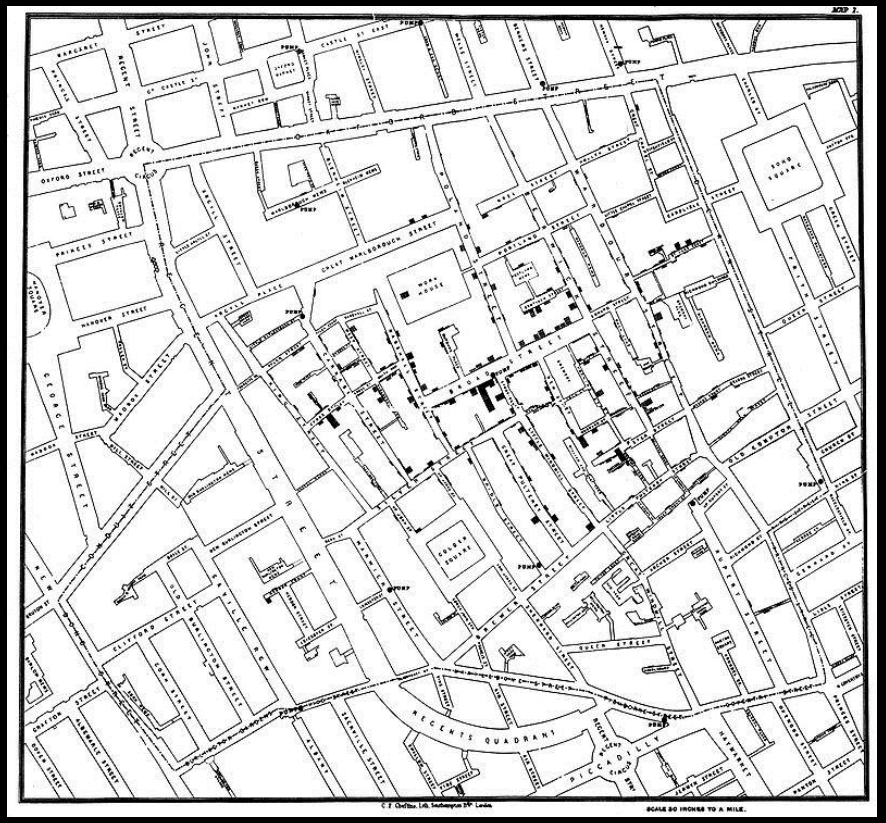
Risk in the geographic context?



John Snow's map of cholera outbreak, London, 1854

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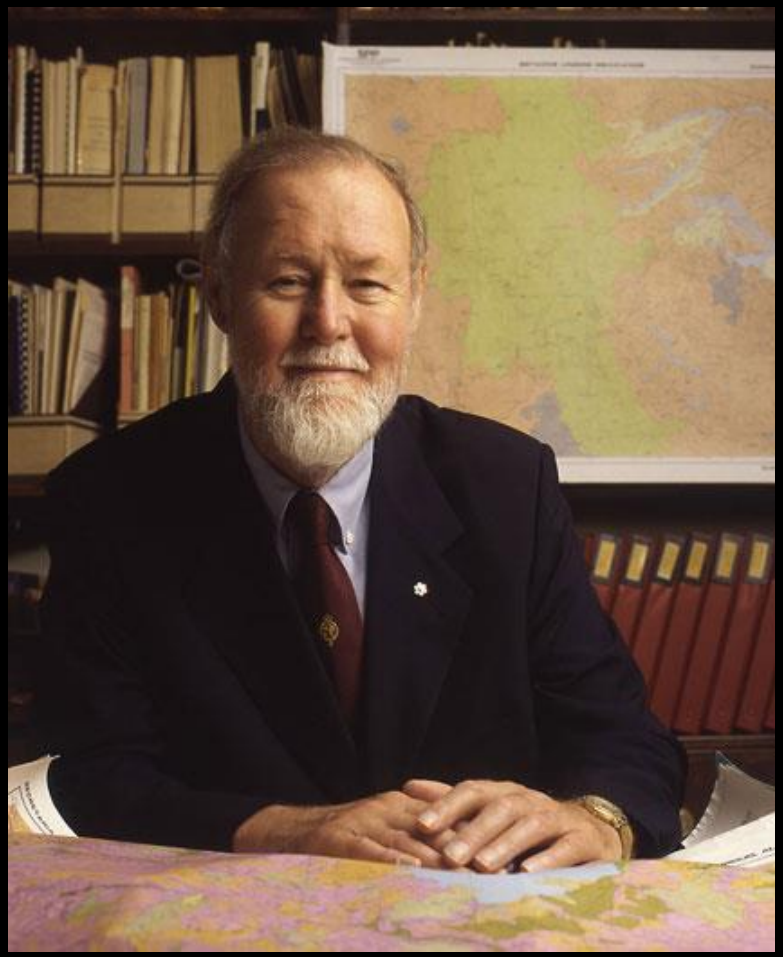

Roger Tomlinson

The “Father of GIS”

Early 1960’s combining land use mapping with emerging computer technology

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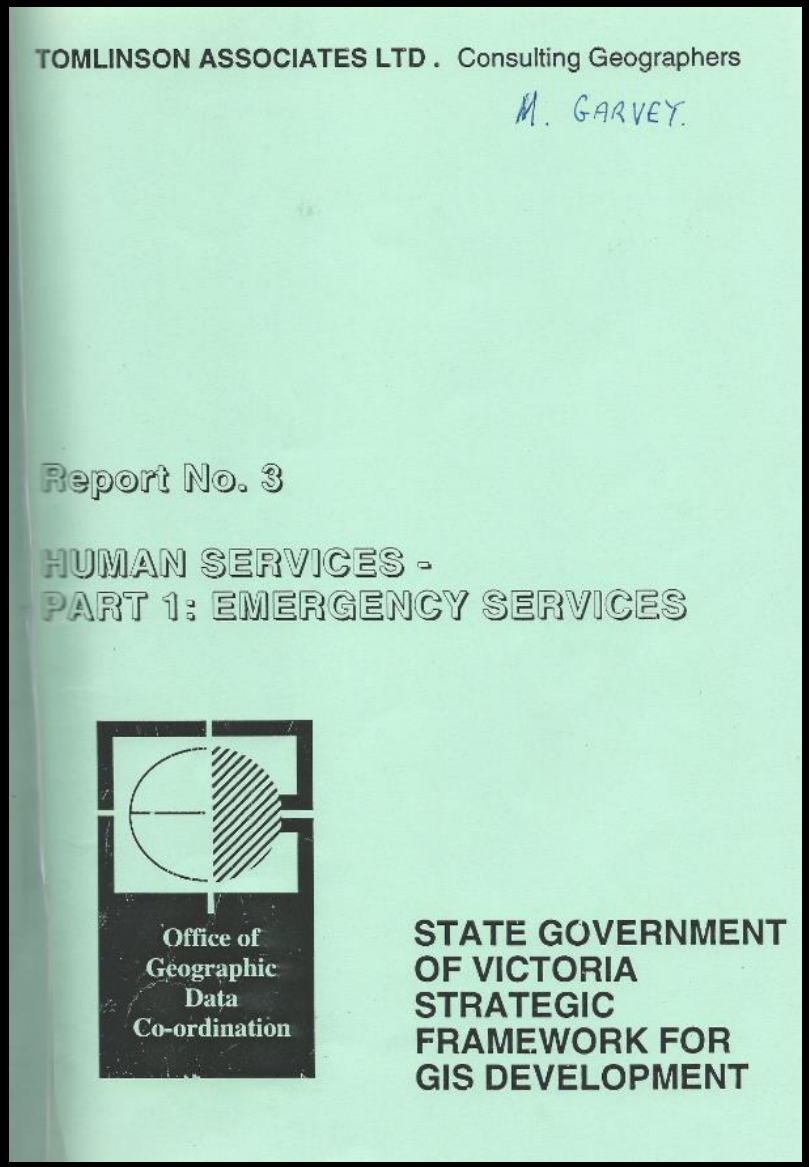

In 1992 Tomlinson and Associates esytablished the Victorian Strategic Framework for GIS Development, 1992

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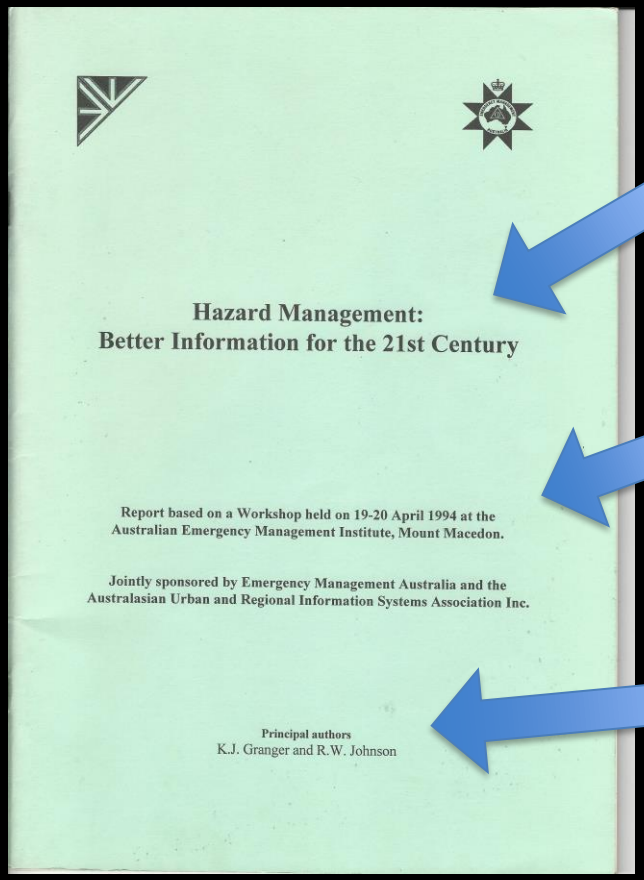
In the mid-1990's national perspective for GIS Data for Hazard/Risk modelling



Hazard Management:
Better Information for the 21st Century

Report based on a Workshop held on 19-20 April 1994 at the Australian Emergency Management Institute, Mount Macedon.

Jointly sponsored by Emergency Management Australia and the Australasian Urban and Regional Information Systems Association Inc.

Principal authors
K.J. Granger and R.W. Johnson

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In the early-mid 1990's GIS data for Hazard/Risk modelling identified

Table 4. Emergency Planning Information Needs

SUBJECT	CYCLONE	STORM TIDE	FLOOD	SEVERE STORM	EARTH-QUAKE	LAND-SLIDE	BUSH FIRE	OTHER FIRE	CHEMICAL SPILL	TRANSPORT ACCIDENT
LOCATION	E	E	E	E	E	E	E	E	E	E
RESOURCES	E	E	E	E	E	E	E	E	E	E
PERSONNEL	M	M	M	M	M	M	M	M	M	M
WEATHER	H	H	H	H	L	M	H	L	M	L
HAZARDS	E	E	E	E	E	E	E	E	E	H
COMMS	M	M	M	M	M	M	M	M	M	L
TRANSPORT	H	H	H	M	H	M	H	H	H	H
POPULATION	E	E	E	E	E	E	E	E	E	L
TENURE	M	M	M	L	M	L	M	M	M	L
HEALTH	M	M	M	M	M	M	M	M	M	M
COMMUNITY	M	M	M	L	M	L	M	L	L	L
UTILITIES	M	M	M	M	M	L	H	H	M	L
TERRAIN	L	H	H	L	H	H	H	L	M	L
BIOTA	L	L	M	L	L	M	H	L	L	L
RURAL USE	M	M	H	L	L	M	H	L	L	L
URBAN USE	L	M	M	L	M	L	M	H	H	M
ADMIN	L	L	L	L	L	L	L	L	L	L

E = Essential H = High priority M = Medium priority L = Low priority

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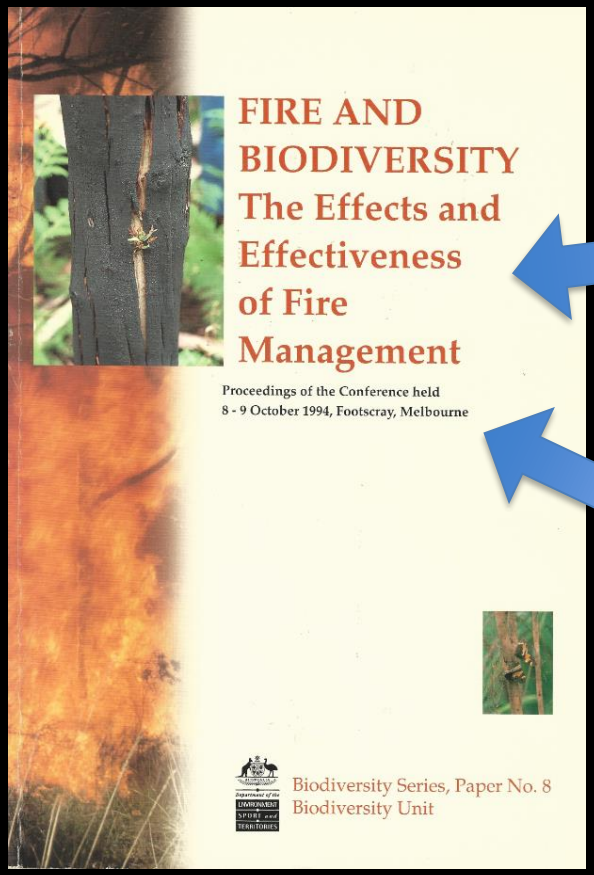
The first attempt's at statewide risk mapping initiative also appear in the mid-1990s



FIRE AND BIODIVERSITY
The Effects and Effectiveness of Fire Management

Proceedings of the Conference held
8 - 9 October 1994, Footscray, Melbourne

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The first attempt's at statewide risk mapping initiative also appear in the mid-1990s

18. THE USE OF GEOGRAPHIC INFORMATION SYSTEMS TO ANALYSE WILDFIRE THREAT

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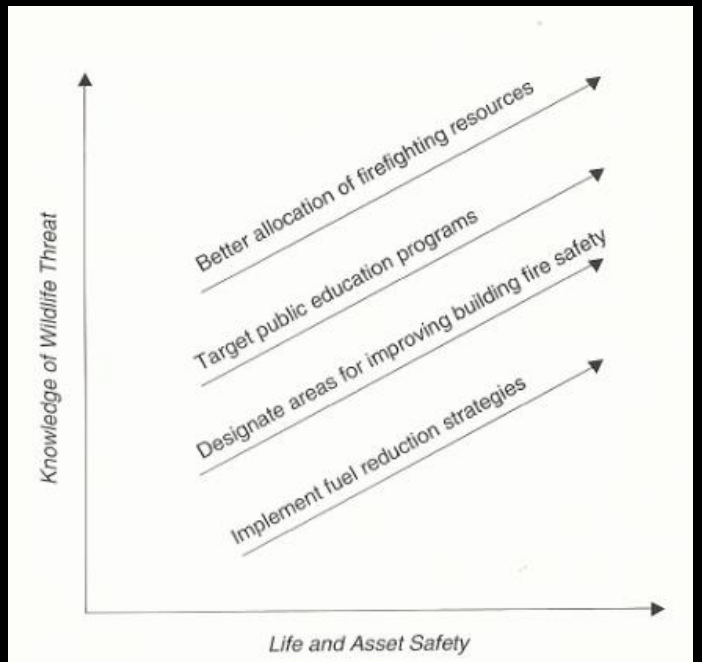

Figure 1 As the knowledge of wildfire threat increases so does the ability to select, target and apply resources

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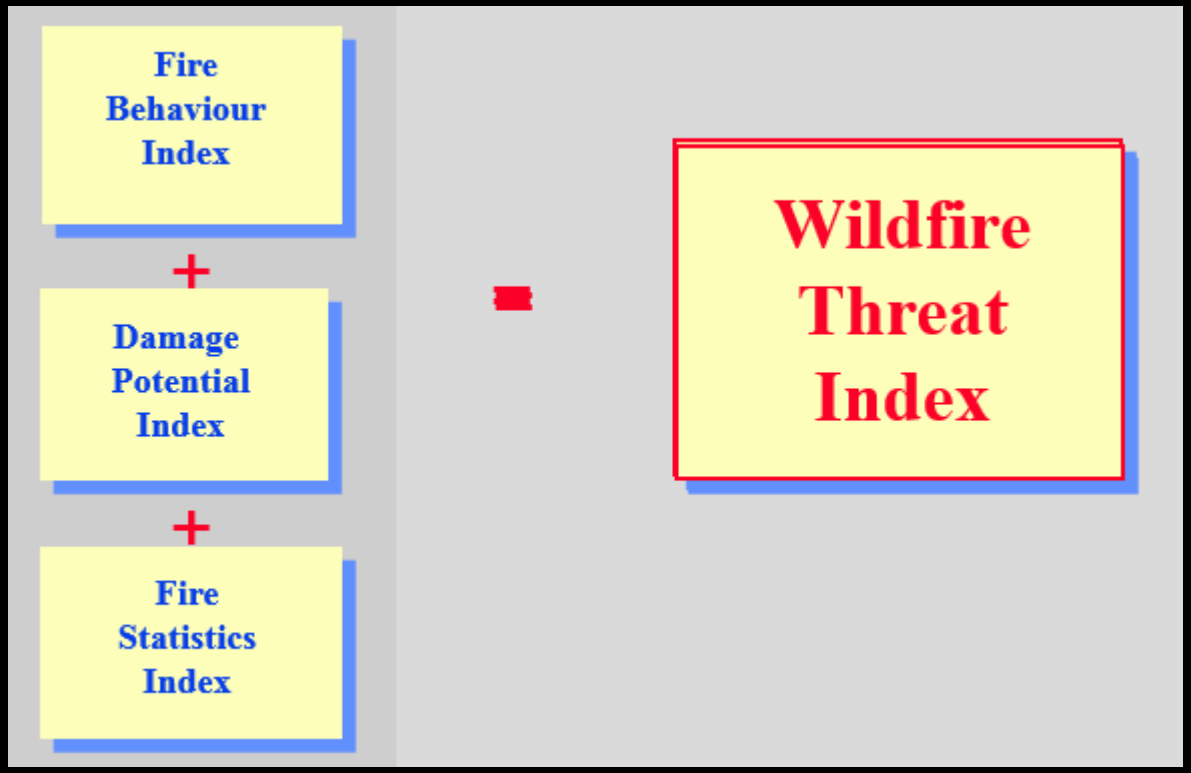
Data problematic: Issues of scale, sensitivity, accuracy .. and the use of the products after they have been created



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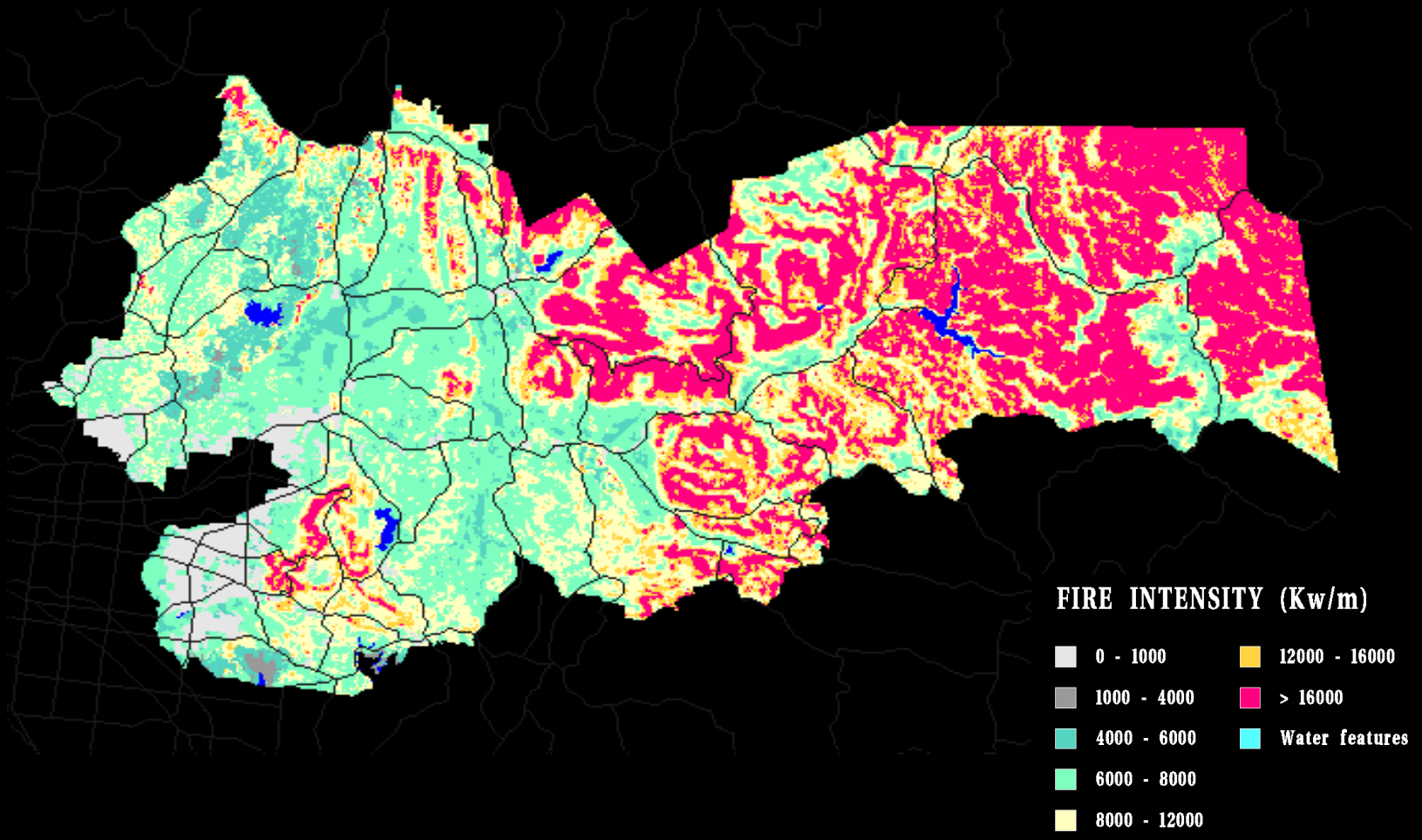
Fire intensity



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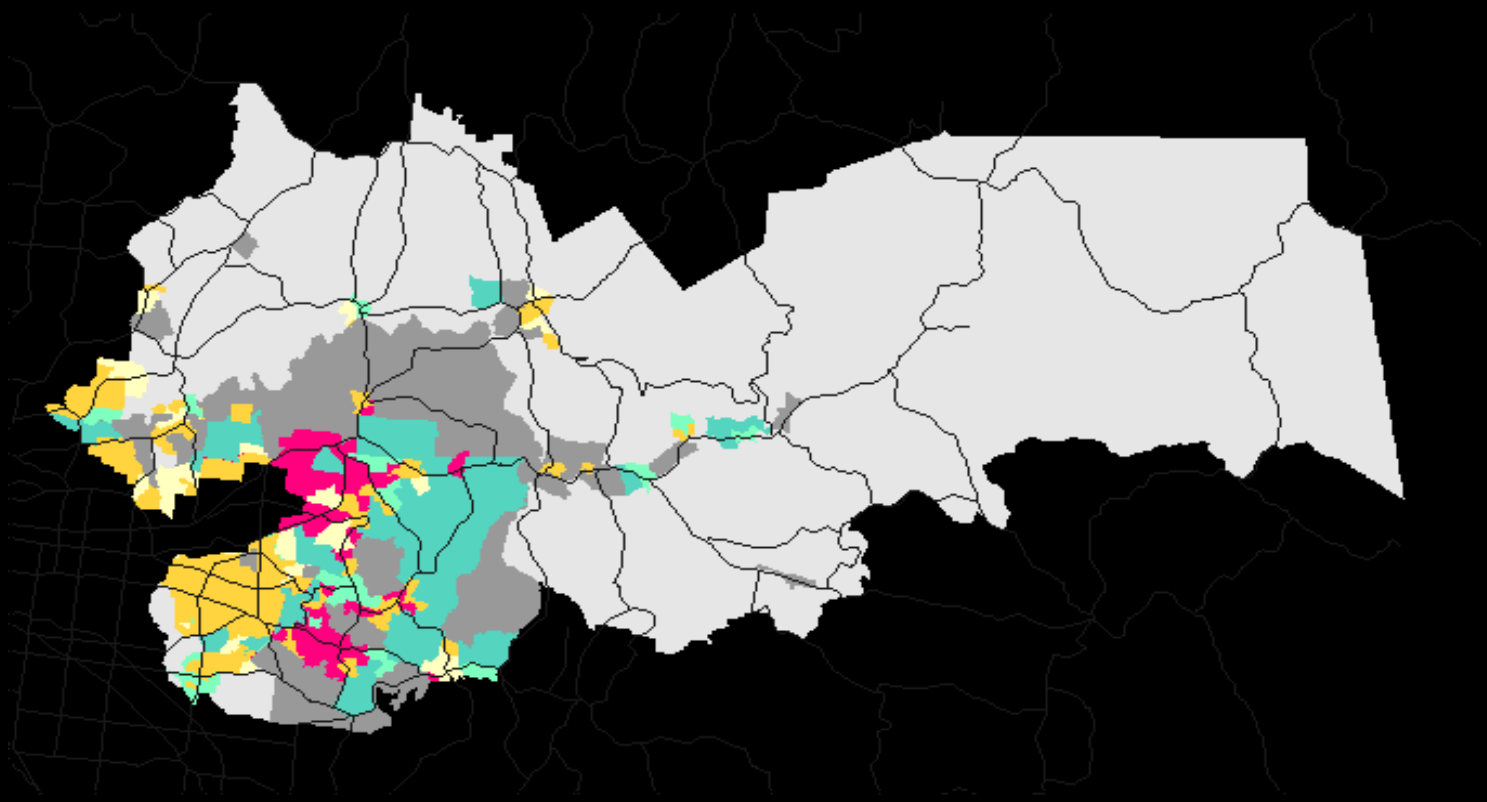
Damage Potential Index



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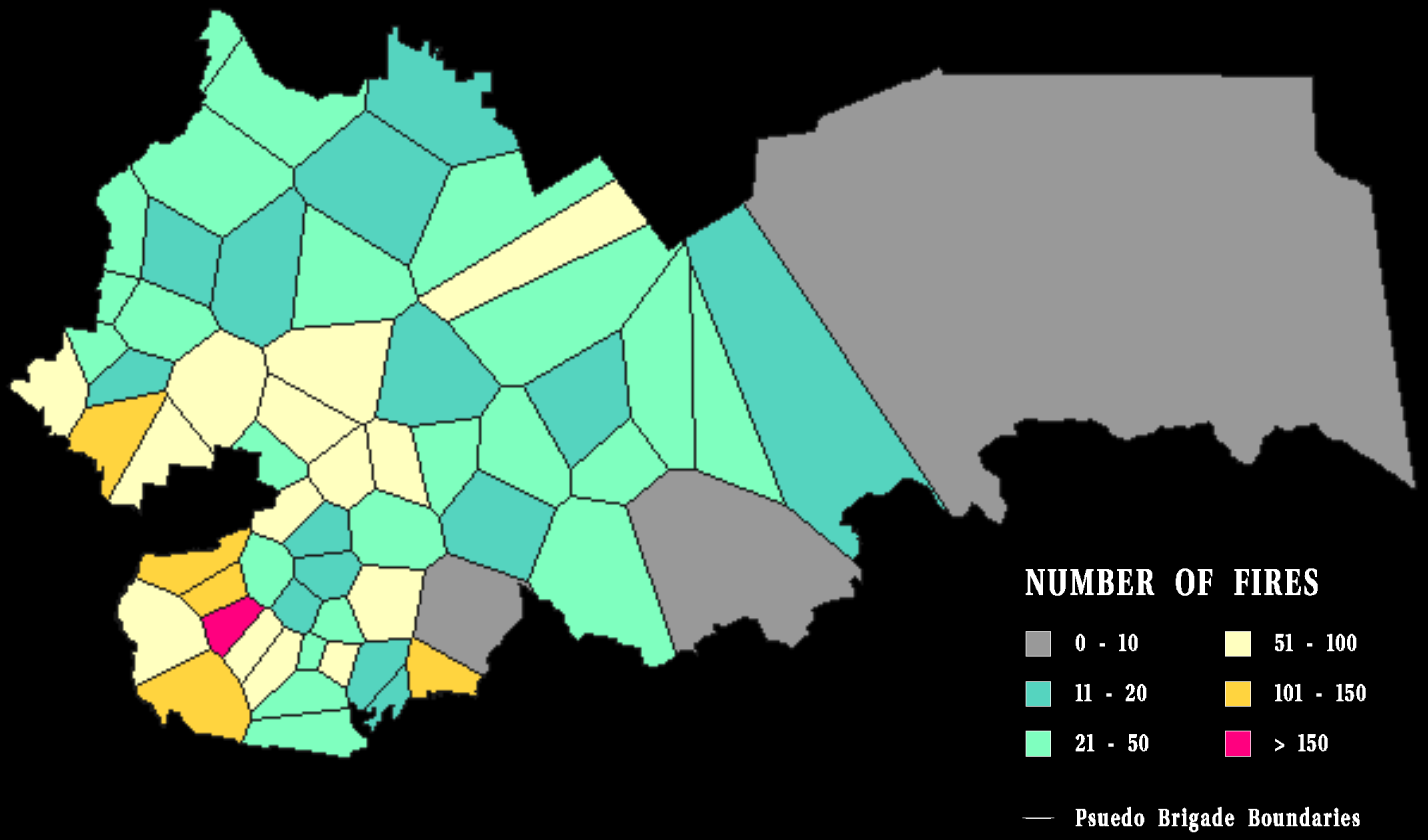
Fire history – note how Brigade Boundaries are represented by Thiessen Polygons



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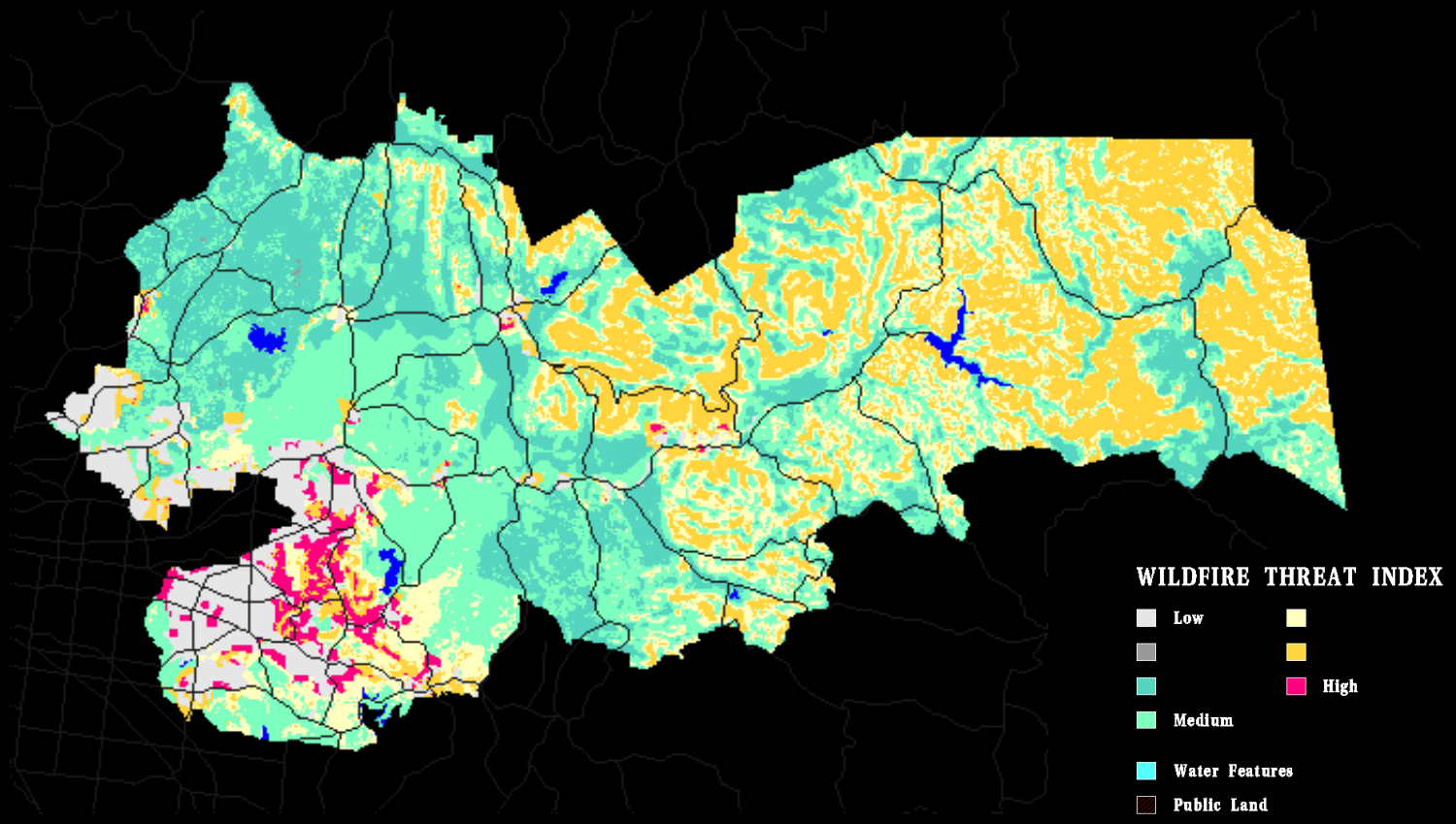
Wildfire Threat Index – A modest success



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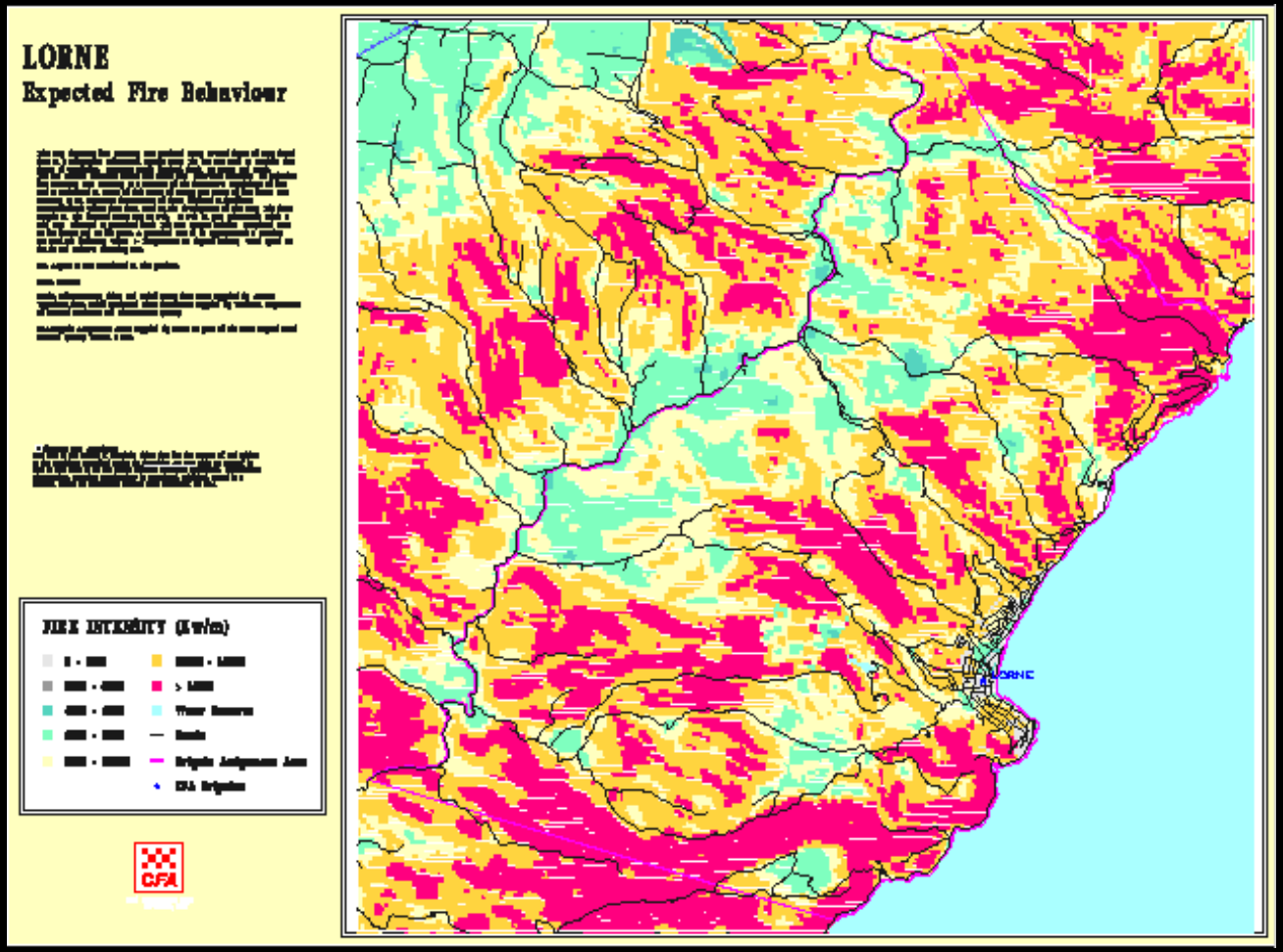
1997/98 Drought
WTM instantly useful as it is called used to target top 200 at risk communities



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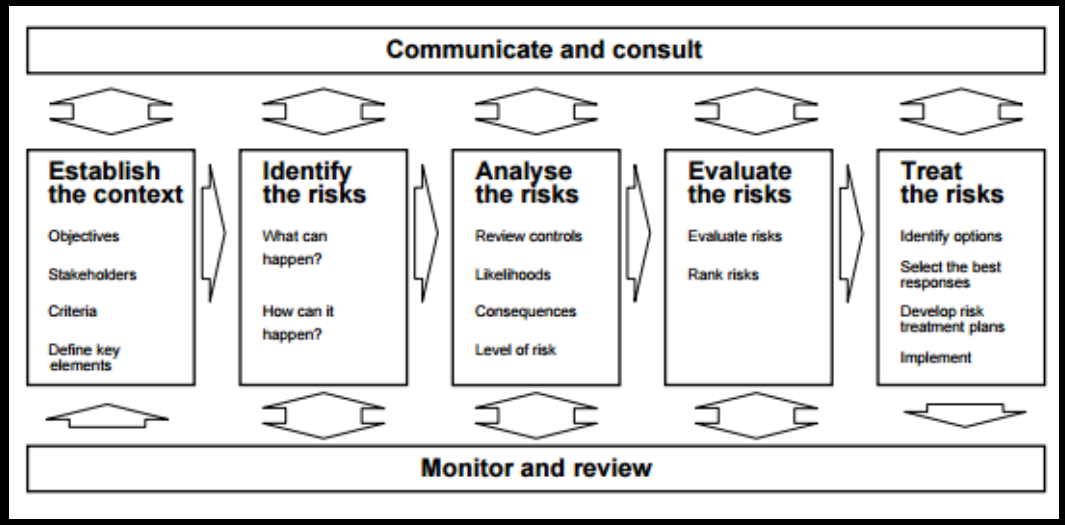
Early 2000's – New Australasian Risk Management Standard Becomes a very popular template



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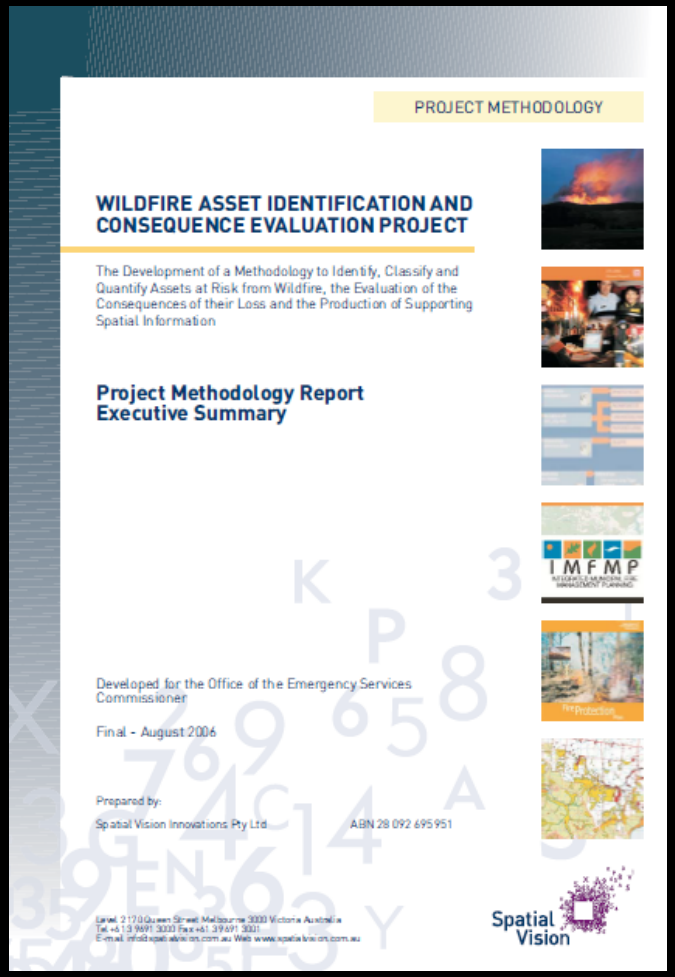
Move forward to 2008
Office of Emergency Services Commissioner leads development of risk tool



WILDFIRE ASSET IDENTIFICATION AND CONSEQUENCE EVALUATION PROJECT

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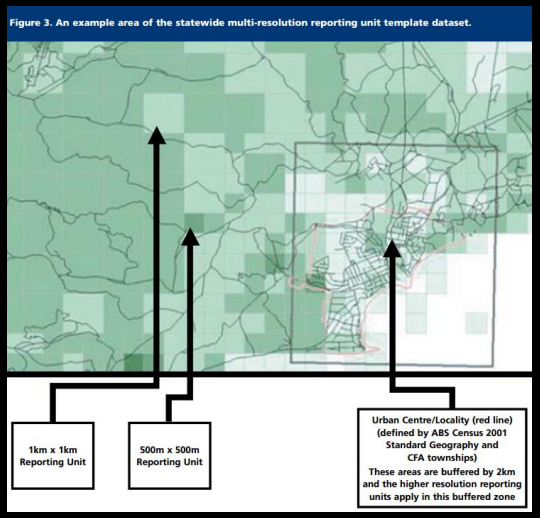
Essentially a data driven model

Table 1. Representation of the asset classification system.

Asset group (TBL Theme)	Asset Class	Number of Asset Categories
Environmental	Biodiversity	29
	Land	NIL
	Water	2
	Air	NIL
Economic	Economic production	24
	Infrastructure	37
	Property	19
Social	Cultural Heritage	12
	Social Infrastructure	40
	Human Life	10
Total		173

173 Data sets to generate product



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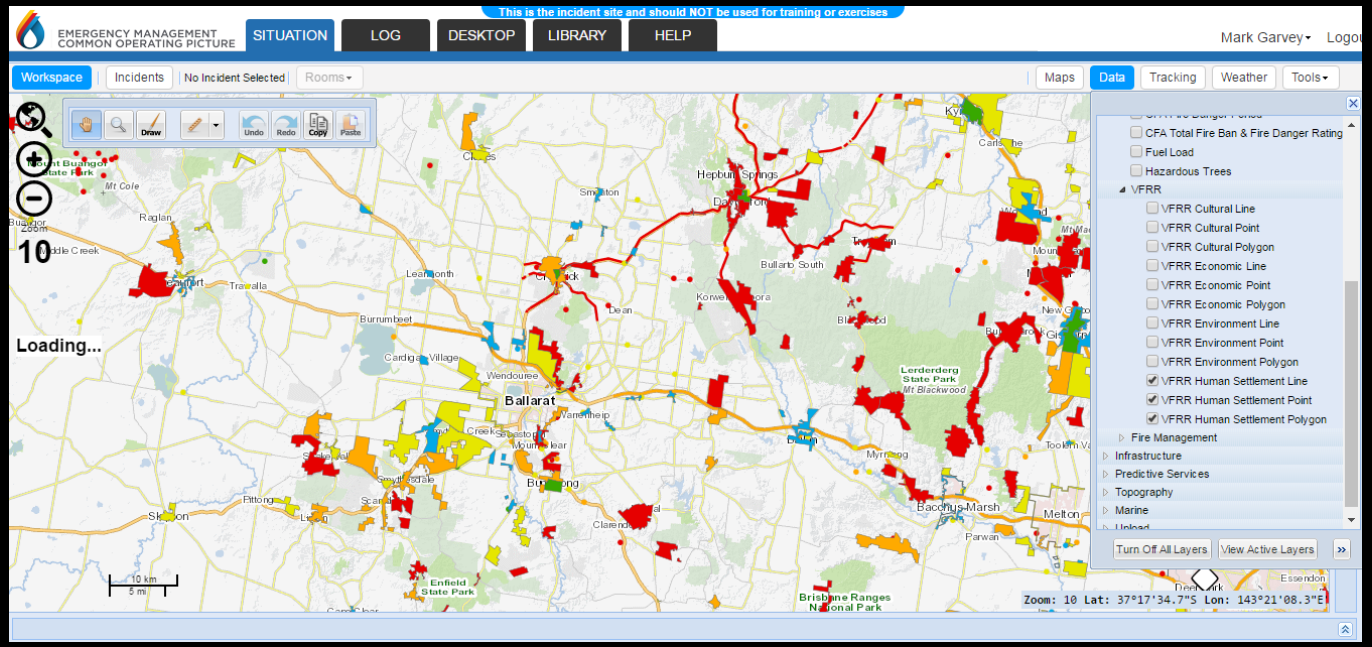
Contemporary Risk Models

Victorian Fire Risk Register

STANDARDS Australia
AS/NZS ISO 31000:2009
Risk management—
Principles and guidelines

AS/NZ ISO 31000:2009



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Victorian Fire Risk Register

Data is generated at municipal level

People (emergency managers, local government, police, utilities) create the data via a standardised facilitated process

Bushfire layers include Human settlement, Economic, Environment and Cultural.

Data not quantitative but very valuable

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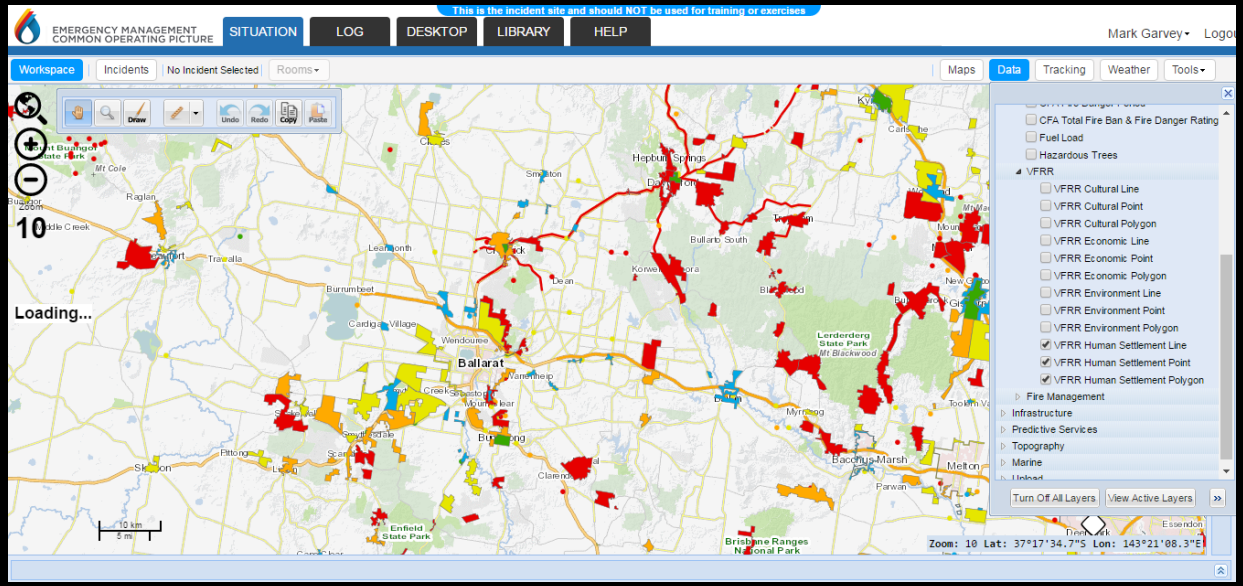
Contemporary Risk Models

Login to EM-COP
Emergency Management Common Operating Picture

STANDARDS Australia
AS/NZS ISO 31000:2009
Risk management—
Principles and guidelines



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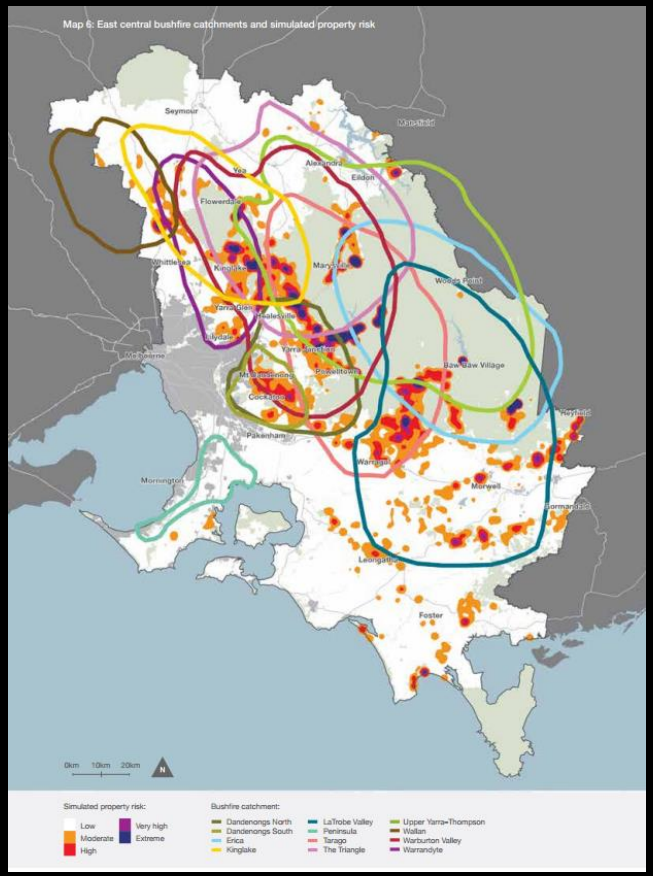
Contemporary Risk Models

Bushfire Risk models



Data driven

Very flexible, scalable and quantitative

But still beholden to data quality and the modellers intuition

DEPI East Central Strategic Bushfire Management Plan 2014

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Railway Bushfire Risk Mapping in Victoria

terramatrix
WILDFIRE MANAGEMENT SERVICES

Commissioned late 2015

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Terramatrix reviewed current bushfire risk assessment approaches

Goal was to gain an understanding of the risk from bushfires:

- Starting on or from the rail network and spreading elsewhere
- Risk to rail assets from bushfires
- Identify methods of prioritising risk reduction activities on rail networks

terramatrix
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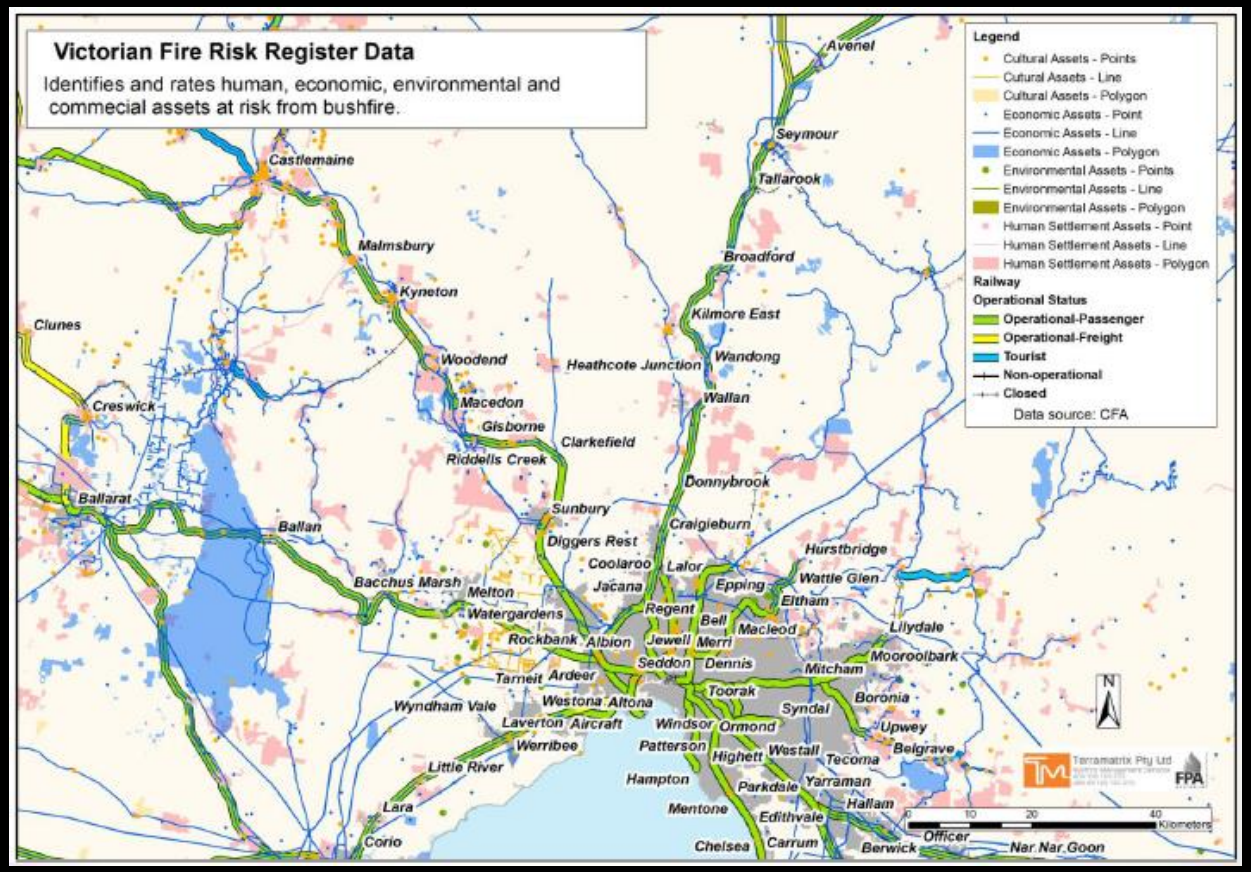
Even though quite sophisticated tools were available local knowledge and local influence were the most important factor in decisions related to risk reduction works



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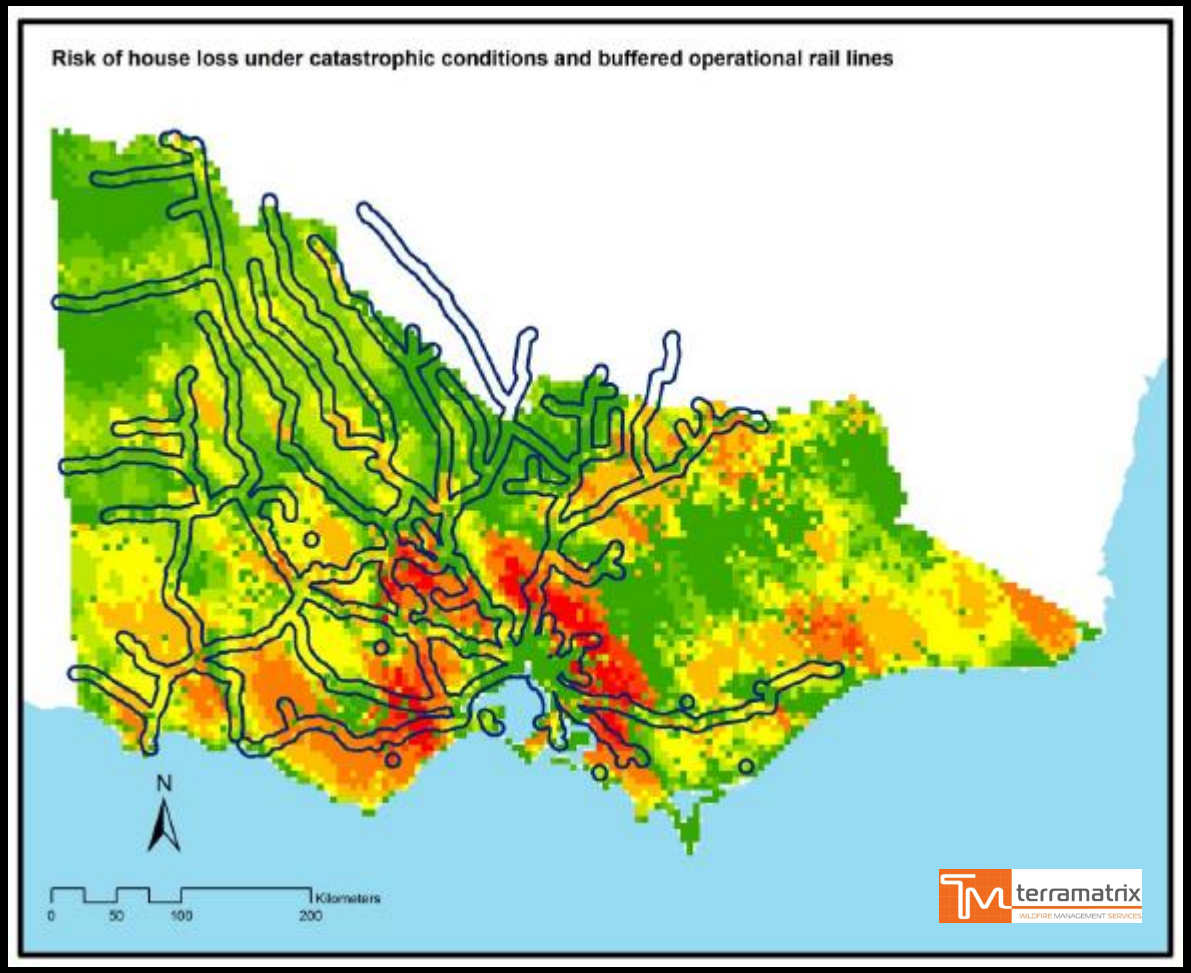
Risk of house loss under catastrophic conditions and buffered operational railways



Data source: DELWP, Vicmap

Findings

- Historical bushfire risk mapping has been surpassed by a number of contemporary products and initiatives
- Computer simulation of risk using the latest bushfire science offers the most potential
- Visualisation of current data such as VFRR, historical fire ignitions, fire prevention audit data and risk of property loss would be of immediate use

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Risk analysis and spatial data: Summary

A continuum of big data, increased specialization and fields of use

But if there are no positive actions following their development then it's just another model

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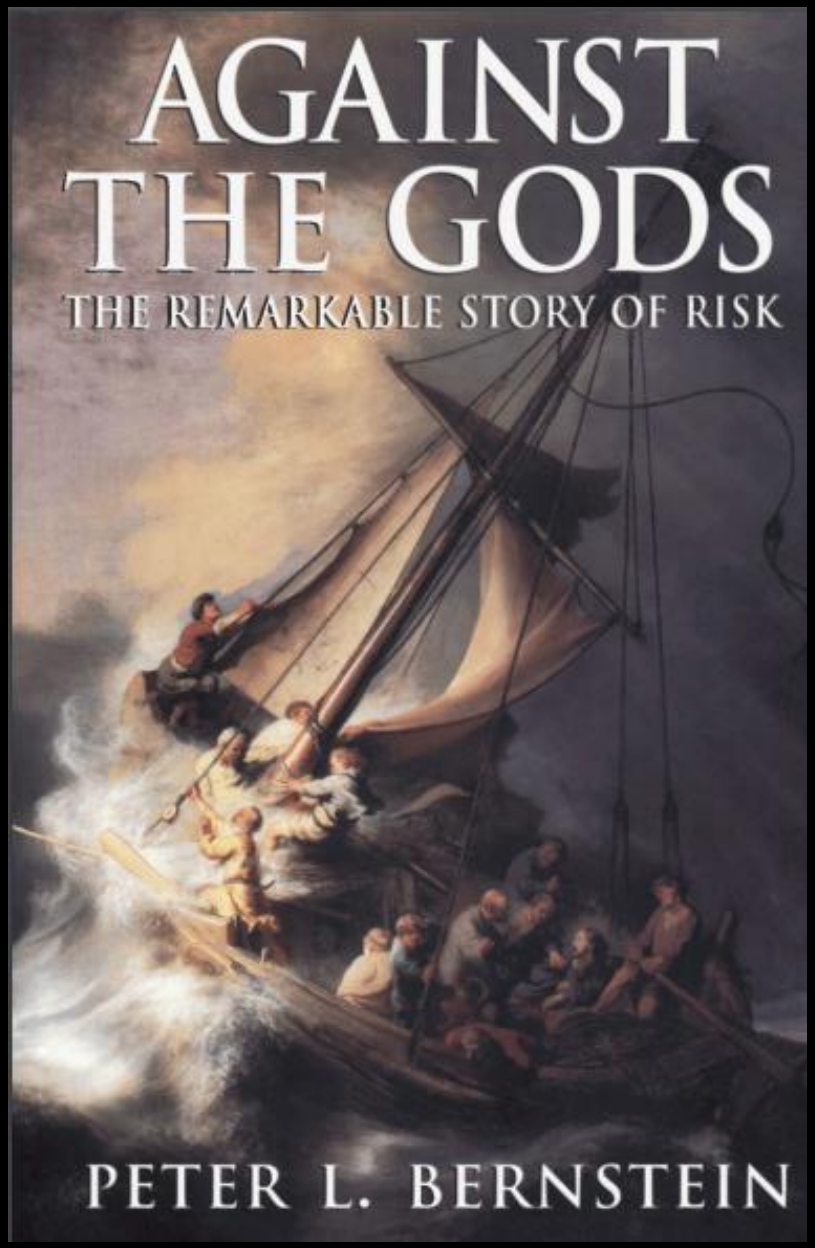

The last words goes to Peter Bernstein

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From “Against the Gods. The remarkable story of risk”
Peter L Bernstein, 1998

“Nothing is more soothing or more persuasive than the computer screen, with it’s imposing arrays of numbers, glowing colors, and elegantly structured graphs. As we stare at the passing show, we become so absorbed that we tend to forget that the computer only answers questions, it does not ask them.

Whenever we ignore that truth, the computer supports us in our conceptual errors. Those who live only by the numbers may find that the computer has simply replaced the oracles to whom people resorted in ancient times for guidance in risk management and decision-making.”

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