



The scarred remains of the Collinsvale Fire, 2013
Photo: Suzie Gaynor

Tasmania fire history and fire hazard mapping

- Landscape fire is an important part of the Tasmanian natural system. Severe fire events, such as the Dunalley fire in January 2013, are driven by local extreme weather conditions.
- However, fire intensity, size and frequency is also driven by vegetation type, with some systems more vulnerable to extreme fire events than others.
- We developed two tools to improve public and researcher understanding of Tasmanian fire dynamics:
 - 1) a real-time map of McArthur Forest Fire Danger index for Tasmania, and
 - 2) a web-based map of Tasmanian fire history.

Online Tasmania Fire History

The Tasmanian Online Fire History is a web-based map of historical landscape fire occurrence in Tasmania, constructed from a variety of sources.

Additional data will be added to the online map as they become available, including reconstructions of early fires from dendrochronological records, and updated high resolution boundaries of more recent fires through Landsat satellite image analysis.

It is a useful tool for land managers and the public to understand the frequency of fire in Tasmania in different ecosystems, and how recently areas were burnt.

The value of this product is in the integration of sparsely collected fire records, and their presentation with a user-friendly interface that does not require specialist software or geographic information system skills.

Constructing the fire history

To contrast the fire history, we first gathered records of fire boundaries from a number of agencies, including the Tasmania Fire Service for fires on private land, the Department of Primary Industries, Parks, Water and Environment for fires in reserves, and Forestry Tasmania for fires in production forests.

We combined the fire boundary information into a single dataset and added fire specific information including the date of the fires and known factors about the fire, for example, the ignition source of the fire if known (for example, lightning, arson or escaped campfire) and the fire name.

We also used satellite-derived records of burnt areas and active fire hotspots from the NASA MODIS satellite to provide additional detail of smaller

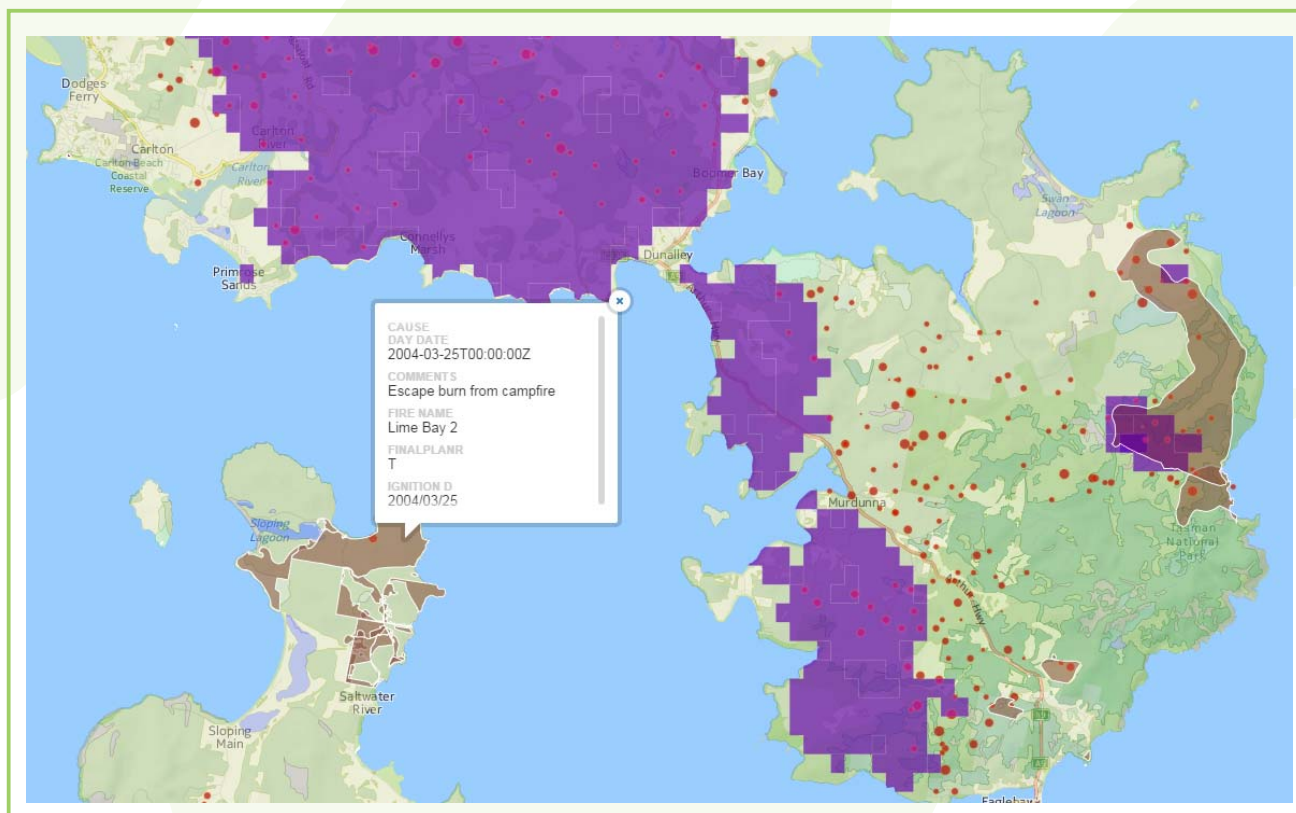
unmapped fires. The MODIS active fire hotspot data also includes Fire Radiative Power; a measure of fire intensity.

Producing the web map

We used the 'CartoDB' platform to host the fire maps, as it allows real-time rendering of attributed geospatial data on the web. The Leaflet Javascript mapping library was used to display the maps on a web page.

Options are included to filter fires by decade, to view the fires overlaid on either a topographic map, or a pre-rendered TasVeg map of ecological communities, and to toggle the visibility of the fire boundaries, MODIS burnt area and MODIS hotspot datasets.

Figure: screen capture from the online fire history website.



Fire hazard mapping in real time

Our online fire hazard mapping tool provides real-time maps of fire danger in Tasmania, with a version being developed for Victoria.

Hosted by the Tasmania Fire Service on their website and also available as a smart phone 'app', the tool shows maps of McArthur Forest Fire Danger Index and serves as a guide to the current fire danger.

The map is updated every 15 minutes using data from weather stations, including temperature, wind speed, humidity and rainfall, plus a seasonal drought factor calculated by the Bureau of Meteorology.

McArthur Forest Fire Danger Index

The McArthur Forest Fire Danger Index is widely used in Australia to describe the likelihood of uncontrollable fires. It provides quantitative estimates of fire behaviour in Australian forests, including flame height and rate of spread. The index is calculated from air temperature, relative humidity, wind speed, and a drought factor that describes the moisture content of forest fuels, based on recent precipitation and evaporation.

Fire danger can increase rapidly under certain weather conditions, with strong, dry winds responsible for much of the extreme fire behaviour experienced in Tasmania, such as the 2013 Dunalley fire.

Real-time Tasmanian Fire Danger

The online tool collects current weather conditions for sites around Tasmania from both the Bureau of Meteorology and the Tasmanian Environmental Protection Agency's BLANKET air monitoring network, and daily drought factor values from the Tasmania Fire Service.

Weather components are interpolated using a spatial Krieg model, which takes into account Tasmania's diverse topography, and a map of current estimated FFDI values, and fire danger categories, is produced.

This map is available on the web with updates at 15-minute intervals, and as a web-based mobile app.

The real-time Tasmanian fire danger 'app' provides the public with up-to-date information on the fire danger conditions in Tasmania. It helps people see how weather condition influence extreme fire behaviour.

The tool has been adopted by the Tasmania Fire Service and is now available on their website.

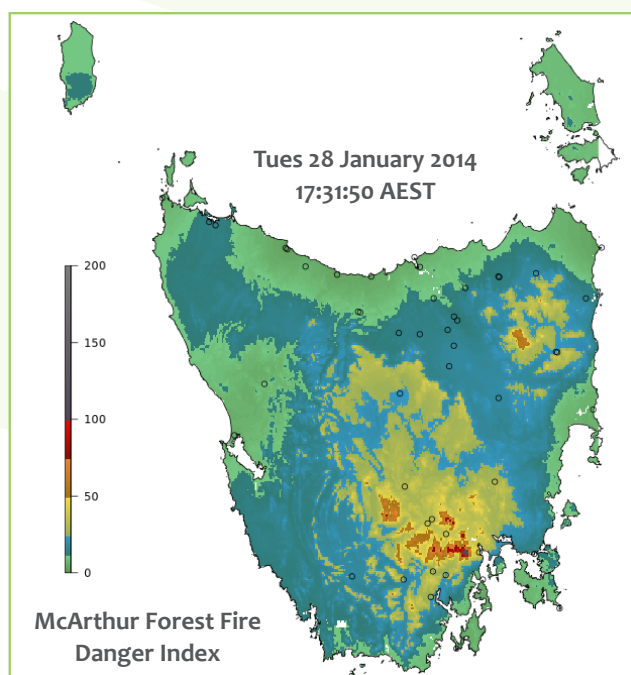


Figure: a screen capture for the real-time Tasmanian Fire Danger Map for the 28 January 2014.

Where to from here?

We are currently testing an expanded version of the real-time Forest Fire Danger Index map that extends across the whole of Australia. This expanded version will provide a wider range of end-users with a useful tool for understanding the dynamics of fire danger in the coming summer.

Data we have gathered on the impacts high-temporal resolution weather impacts on fire intensity and spread is informing ongoing research on bushfire risk and fire ecology in Australia.

Increasingly refined data on Tasmanian fire history is also continuing to be added to the web map, and discussions have been held with stakeholders to implement automated updates to this map.

Who are the researchers?

Prof David Bowman



David is Professor of Environmental Change Biology at the School of Plant Science, University of Tasmania. His research is focused on the ecology, evolution, biogeography and management of Australian forested landscapes.

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Dr Grant Williamson



Grant is a landscape ecologist and spatial scientist with the University of Tasmania. He works in the Vegetation and Fire Project team to examine how fire activity varies in Tasmania and the Australian Alps according to landscape, vegetation type, land tenure and management history.

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Collaborators

The Tasmanian Fire Service

The tools are hosted by the NeCTAR research cloud: the National eResearch Collaboration Tools and Resources.

Weblinks

Tasmanian Fire History Map:

<http://ecb.tas dendro.org/map.html>

Real Time Tasmanian Fire Danger:

<http://fire.tas.gov.au/Show?pageId=colFfdilIndex>

About the NERP Landscapes and Policy Hub

The Landscapes and Policy Hub is one of five research hubs funded by the National Environmental Research Program (NERP) for four years (2011–2014) to study biodiversity conservation.

We integrate ecology and social science to provide guidance for policymakers on planning and managing biodiversity at a regional scale. We develop tools, techniques and policy options to integrate biodiversity into regional-scale planning.

The University of Tasmania hosts the hub.

www.nerplandscapes.edu.au



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