


Rural Fire Research

HIGHLIGHTS 2009/10





Scion's Rural Fire Research Group is New Zealand's only provider of specialist fire research expertise in rural and forest landscapes, developing the science and technology needed to protect life and property and manage fire in the landscape.

Understanding fuel moisture and fire

Two Masters studies undertaken by Scion researchers investigated the relationships between fuel moisture (moisture in vegetation) and fire ignition and spread in grass and gorse. Studies included laboratory and field experiments to determine the fuel moisture thresholds for ignition and fire spread in gorse scrub, and ignition of grass fuels from a range of ignition sources. These sources included hot metal contact (vehicle exhausts), carbon emissions from exhausts (e.g. 4WDs, trains), hot metal sparks from machinery (e.g. grinding operations) and open flame.

This research has resulted in significantly improved understanding of the conditions in which fires will ignite and spread in these prominent vegetation types. The results have been used to produce guidelines based on fire weather conditions for use in supporting fire management decision-making, such as fire permit issue, vehicle access restrictions and education of farmers and recreational users.

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Fire behaviour prediction tools

Ongoing research to develop a New Zealand specific simulation model for predicting the spread of fires across landscapes achieved an important milestone this year. A Canadian tool called "Prometheus", has been modified for use in New Zealand by incorporating local fuel load and fire rate of spread models, and adapting fire danger rating calculations for New Zealand's Southern hemisphere location. A number of past New Zealand fires were successfully modelled using data on vegetation (fuel) types and associated fire behaviour collected by Scion over many years.

A number of demonstrations of the model have been made around the country, and a training course was run with New Zealand fire managers and GIS technical experts.

Work is now under way to apply the fire simulation model to a range of fire management applications including operational prediction of fire growth during wildfires events, strategic risk assessments and planning, and reporting on firefighting effectiveness and values saved.

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Fire danger communication

Scion completed a research project to determine understanding of fire danger messages in New Zealand. Data was gathered through one-on-one interviews with fire managers and the general public in the Canterbury and Northland regions. Interviews of fire managers were designed to investigate the messages that Rural Fire Authorities intend to convey to the general public through fire danger warning signs and other fire prevention communications. Using a structured questionnaire, surveys were also undertaken with over 100 people including residents, urban visitors or international visitors to rural areas. These were aimed at determining awareness, understanding of, and expected responses to these warning messages and knowledge and perception of publicity initiatives.

Results show that there is no clear definition by fire managers of the behavioural changes expected of the public as the fire danger level increases. This misunderstanding is further confused by overlap between the “half-grapefruit” fire danger warning signs and other fire prevention communications such as fire season status and burn permit requirements. The public are unsure of what the fire danger classes mean, and what they are allowed or expected to do as fire risk increases.

This ground breaking research has provided many important insights about fire danger communication. Rural Fire Authorities are keen to use this information to improve the effectiveness of fire danger warnings and other fire prevention communications that aim to reduce the occurrence of fires and associated risk to the public and environment.

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Funding for the Scion Rural Fire Research Group is provided by FRST along with direct funding and significant in-kind support from NZ Rural Fire Sector organisations. These organisations include the National Rural Fire Authority, NZ Fire Service Commission, NZ Forest Owners Association, Department of Conservation, members of Local Government NZ, NZ Defence Force and Federated Farmers of NZ Inc.



Keeping watch on fire fighters

A PhD study aimed at improving hazardous occupations has provided valuable information about workloads experienced by rural fire fighters. The study undertaken by human factors specialist, Richard Parker, arose from the need to measure what people do in dangerous situations where it is difficult for an observer to tag along.

As a result of his research, Richard has developed a unique method of using helmet cameras and sensors that record what fire fighters are doing, where they are doing it, and how hard they are working at the time (i.e. heart rate). Richard has combined this technology with reflective interviews that provide a deep understanding of why workers do what they do. The collected data will be used to aid development of guidelines for fireline production using different fire fighting resources.

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Building international networks

Social research is becoming more recognised as a valuable input into rural fire management. Many of the fire-related social issues experienced in New Zealand are common to other countries, so international linkages in this field are growing. In 2009/2010, Scion social researcher, Lisa Langer, received funding support from the USDA Forest Service and the Australasian Bushfire Cooperative Research Centre (Bushfire CRC) Australia to attend the Human Dimensions of Wildland Fire Conference in San Antonio, Texas. This conference provided a valuable networking opportunity particularly with US, Canadian and Australian collaborators, to further Scion's collaboration in international fire research.

Lisa Langer and Grant Pearce also attended a limited invitation symposium hosted jointly by the Bushfire CRC and the US Department of Homeland Security on rural/urban interface fire issues. Invitees included 40 Australian and US fire managers and researchers in the areas of fire behaviour, building design/risk planning and community safety. Discussions with both Australian and U.S. researchers were successful in raising the profile of the New Zealand fire programme, and significantly enhancing potential for research collaboration.

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