Background briefings on emerging issues for fire managers from AFAC and Bushfire CRC.

bushfire CRC

AUSTRALASIAN FIRE AUTHORITIES COUNCIL

FIRE NOTE

ISSUE 19 APRIL 2008

MEASURING RESPONSES TO FIRE REGIMES IN NORTHERN AUSTRALIA

A SUMMARY OF A COMPLETED BUSHFIRE CRC PHD PROJECT BY KEN SCOTT

Tropical savannas arch across the northern one-third of Australia, and are undeniably the continent's most fire-prone ecosystem.

In contrast to southern Australia, prescribed fire is used primarily for biodiversity conservation in the vast unpopulated wilderness areas, rather than for the protection of life or property.

Despite the regularity and deliberate use of fire though, little is known of the role of fire in ecological processes, and the impact of different fire regimes on species abundance in these savannas.

In early 2004, a team of Bushfire CRC researchers and students embarked upon a new fire education and research project based at the Territory Wildlife Park near Darwin. Research to date has measured fire intensity and fuel dynamics, and the impact of six fire regime treatments on various elements of the biota, including skinks, ants, grasshoppers, soil microbes and macroinvertebrates, woody plants, forbs and grasses.

The research team included one of the first students to join the Bushfire CRC, Ken Scott. In March 2008, Scott finished his research at the Territory Wildlife Park, drawing to a close four years of work investigating the impact of fire on herbaceous understorey plants.

ABOUT THIS PROJECT

This *Fire Note* is a summary of Ken Scott's PhD research project through Charles Darwin University, under the supervision of Alan Andersen of CSIRO Sustainable Ecosystems.

His project, "Population dynamics of native grasses in response to fire regimes in northern Australia" is part of Bushfire CRC Project B 3.2 Prescribed fire and biodiversity in tropical savannas.

Below left: Ken Scott, at left, with fellow researchers after a burn at the Territory Wildlife Park.

Below right: the project measured fire intensity and fuel dynamics, and the impact of fire regimes on various biota.

© BUSHFIRE CRC LTD 2008

FURTHER READING

Scott KA (2007) Flora of the Territory Wildlife Park, Berry Springs, with particular reference to the grass layer. *Northern Territory Naturalist* 19: 25-34.

Scott KA, Setterfield SA, Douglas MM, Andersen AN (2007) Fire-related soil temperature in the Top End. Poster presented at the Bushfire CRC / AFAC 2007 Conference, Hobart.

More information on Ken Scott can be found at: http://www.bushfirecrc.com/students/

KEY FINDINGS

The experiments found that the species composition of understorey plants remained unchanged by different fire regime treatments, including the extremes of annual burning and fire-exclusion, over four years. Instead, their distribution in the landscape was strongly influenced by environmental factors such as soil moisture, shading from trees and litter cover. The density of understorey plants increased progressively during the four year study, corresponding to increasing rainfall.

Understorey plants were resilient to high fire frequencies because of their ability to sprout after fire and avoid heat-related mortality, as buried seeds in a soil seed bank. Adults of dominant perennial grasses showed a similar survival rate within annually burnt and unburnt plots, after a three-year observation period. The density of germinable seeds in the soil seed bank was not significantly reduced by fire. In fact, laboratory heating promoted seed germination (especially native legumes), and exposure to ambient smoke increased the germination of a common annual grass.

Long term (15 year) fire exclusion however may have a profound effect on the species composition of understorey plants in savannas. A comparison between a long unburnt and frequently burnt site revealed a significant difference in grass species composition, owing to the loss of common species such as *Sorghum intrans* with fire exclusion (there was however little difference in total grass species richness).

IMPLICATIONS

The maintenance of understorey species composition with different fire regimes in the short-term is reassuring for land managers who deliberately apply fire in the landscape for biodiversity conservation. Vegetation dynamics associated with different fire regimes in the medium term (4 - 15 years) remains unknown; a challenge for land managers and researchers alike.

THE FUTURE

Bushfire CRC research continues at the Territory Wildlife Park, with an extensive list of activities planned for 2008.

Ken Scott is now planning on a career in fire ecology research.

Fire Note is published by the Bushfire Cooperative Research Centre (Bushfire CRC) with the Australasian Fire Authorities Council (AFAC).

Bushfire Cooperative Research Centre
Level 5/340 Albert Street
East Melbourne VIC 3002

Telephone: 03 9412 9600
www.bushfirecrc.com

Bushfire CRC is a national research centre in the Cooperative Research Centre (CRC) program, formed in partnership with fire and land management agencies in 2003 to undertake end-user focused research.

Australasian Fire Authorities Council
Level 5/340 Albert Street
East Melbourne VIC 3002

Telephone: 03 9418 2388
www.afac.com.au

AFAC is the peak representative body for fire, emergency services and land management agencies in the Australasia region. It was established in 1993 and has 26 full and 10 affiliate members.