BLAZING COMPUTERS

WILDFIRES are a major threat to human life and property and can affect wildlife. To make matters worse, bushfires move rapidly and a sudden change in conditions, such as wind direction, can have disastrous results. A Canadian, Judi Beck, is in Perth to help CALM's firefighters to predict the unpredictable - by using computers. Soon, updating a fire situation will be as easy as pressing a button.

A new Wildfire Incident Management System (WIMS) will soon make it possible to map fire behaviour from the forest onto a computer screen.

Firefighting (especially in forest country) is a major operation that requires a huge amount of information and planning.

To accurately predict the behaviour of a particular fire and plan strategies to counter it, firefighters need to know about fuels, weather, topography and the ignition point of the fire.

It is also essential to know what resources are available to fight the fire: information about fire crews (who they are and where they are positioned), vehicles and aircraft.

In Western Australian forests, an accurate fire-prediction technique already exists, but it must be worked out manually. As a result, it is very time-consuming and requires constant practice and expertise to implement. Although the manual system has been very successful in managing smaller fires, it is cumbersome when dealing with large complex fires or multiple fires in the same forest.

WIMS will enable fire controllers to simulate and map the potential spread of a fire and its intensity. The spread model rapidly integrates complex terrain, fuel and weather scenarios.

When a fire is located, firefighters can use the computer to build an accurate picture of the topography and fuels through which the fire is burning.

Different line colours and patterns will represent roads and creeks. Point features such as vehicles, heavy machinery, fire crews and aircraft will be depicted by symbols that can be moved around the screen.

Each district has established fire gangs and crews that have been together for a whole season. The computer can store information about each individual and use it to show where they are positioned during the fire.

Users will be able to "zoom in" on part of the fire scenario to get further details. Who is in that vehicle? What is their radio call sign? A spot fire has jumped the road - which crew can get to it quickly?

And when a new shift of firefighters takes over, important local knowledge, situation summaries and resource details can be passed on through pictures and reports that can be interpreted readily and correctly.

The computer will make it easier to evaluate potential fire behaviour and take quick action to rectify any problems. For example: a wind change is expected some time between 1400 and 1600 hours; how will the fire behave if the wind change occurs at 1430 hours? Where will the fire be at 1500 hours and what if the change doesn't come until 1600 hours? Are there areas in which the fire behaviour may endanger the lives of firefighters?

If there are multiple fires, WIMS will help fire controllers maximise suppression efforts and minimise losses. During the Cyclone Alby emergency in 1978, 92 separate wildfires developed in State forest in a few hours. Under these circumstances, it is extremely difficult to consider all values at risk and to identify suppression priorities. WIMS can be used to simulate the growth of each fire over a specified time, and to compile statistics that summarise the potential losses, allowing

Terrain data such as slope, aspect and elevation, made available to WIMS by CALM's Land Information branch, can be processed and stored in the computer.
Photo - John Goodlad ▲

fire controllers to make effective decisions, based on as much relevant information as possible.

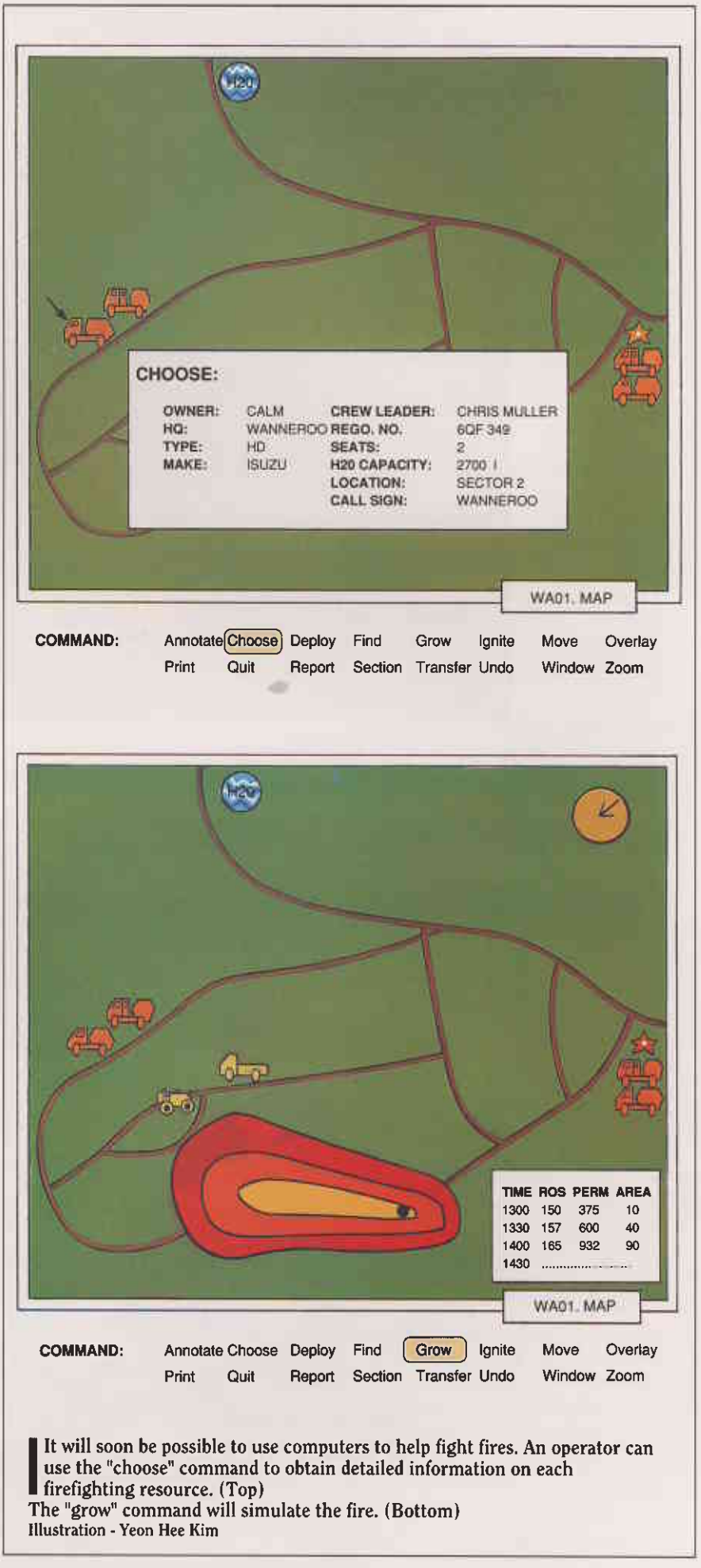
WIMS can also be used to help train fire controllers and fire bosses in wildfire management by allowing them to simulate fire situations and experiment with alternative strategies.

THE TASK HAS JUST BEGUN

The first phase of developing WIMS began with the derivation of equations for the Forest Fire Behaviour Tables for Western Australia, developed many years ago by George Peet and Ric Sneeuwjagt. This fire behaviour prediction system is a manual, tabular system (the famous "little red book" used by CALM staff almost daily, each summer). Now that the equations are available (more than 75 rather ugly-looking mathematical relationships), the prediction system can be readily computerised.

The WIMS computer programs are still being designed, encoded, tested and refined. There is much to be done. Throughout this process, experienced firefighters will be asked to test components of the system and offer criticism and suggestions. Training programs will have to be developed and a system management group established. It's a lot of work, but the benefits will be worth it. ◘

Judi Beck is a PhD student at the Curtin University's School of Computing Science, on a CALM PhD research scholarship.



It will soon be possible to use computers to help fight fires. An operator can use the "choose" command to obtain detailed information on each firefighting resource. (Top)
The "grow" command will simulate the fire. (Bottom)
Illustration - Yeon Hee Kim

LANDSCOPE

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Dolphins, whales and seals frequently strand along the WA coast. Find out who helps them and what they do on p. 10.

Powerful forces have formed the rocks and land surface of WA over billions of years. See p. 48.

Why are the thousands of feral camels that roam inland Australia the scourge of the desert? Turn to p. 22.

Explore the fascinating subterranean worlds deep beneath the earth on p. 28.

Inlets and rivers, towering karri and tingle forests, rugged coastline and remote wilderness areas - Walpole-Nornalup National Park has it all. See p. 15.

C O V E R

Australian sea-lion (Neophoca cinerea). *Photo - Nick Gales*

F E A T U R E S

R E G U L A R S

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