CliMag

Edition 16 January 2009

R&D meets farmers' needs in a changing climate

With climate change predictions pointing to Australia's climate becoming even more variable, farmers are looking for more accurate seasonal forecasts that can be interpreted to help them make better decisions about planting, sowing, harvesting and stocking rates.

The Managing Climate Variability program recognises this need for adaptive management, especially given the increasing pressure farmers are experiencing with less reliable and declining rainfall.

Land & Water Australia (LWA), a key partner and the manager of the program, has recently extended its commitment creating a seven-year phase of investment.

'This research investment will improve the quality of forecasting and climate predictions needed by farmers to make critical decisions', said Bobbie Brazil, Chair of the Board of LWA.

The Managing Climate Variability R&D strategy focuses on improving forecasting—accuracy, lead-time and ease of use; providing tools and services for managing climate risk; and increasing adoption of climate risk management. The research will:

- link long-term climate change science to help develop global circulation models that more accurately represent Australia's climate drivers and are better able to predict seasonal climate conditions
- use forecasts to predict key biophysical attributes, such as soil moisture and runoff
- provide tools using forecasts and projections for biophysical attributes to link with the decisions that farmers need to make to better adapt to Australia's changing climate

The table on page 2 shows the research themes, the outcomes from this investment and percentage of effort that is being invested by Managing Climate Variability. The diagram illustrates the interaction between
these themes.

The Managing Climate Variability's R&D strategy is now available. To order, contact CanPrint on 1800 776 616 quoting product code PN22016 or go to www.products.lwa.gov.au where you can order or download this publication.

Contact coordinator, for more information:

Colin Creighton, Managing Climate Variability
Land & Water Australia
Phone: 02 6263 6027, Mobile: 0418 225 894
Email: colin.creighton@lwa.gov.au

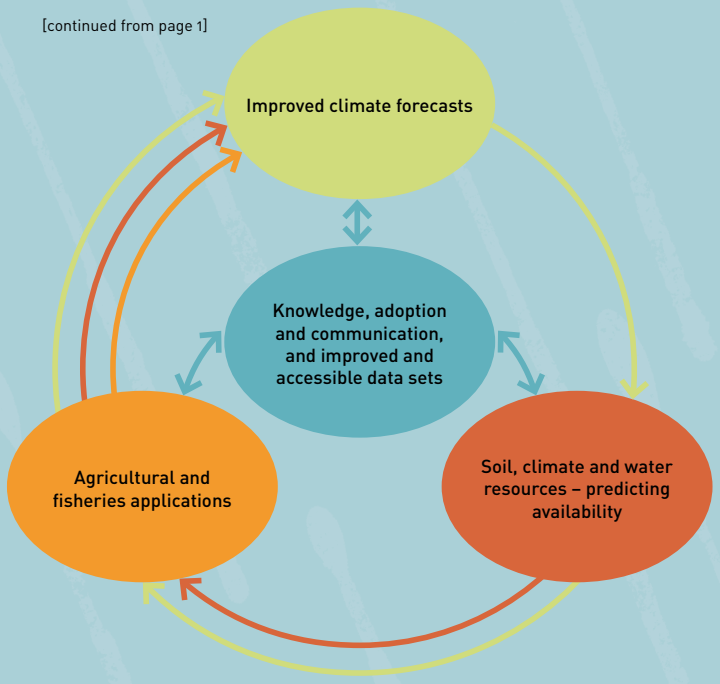
[continued on page 2]

Jay Collins on his Morawa property. See article on p6.

In this issue

MANAGING CLIMATE VARIABILITY R & D PROGRAM

[continued from page 1]



Goal To help farmers and natural resource managers manage risks and exploit opportunities given Australia's variable and changing climate

By
- Improving forecasting accuracy, lead-time and ease of use
- Providing tools and services for managing climate risk
- Increasing adoption of climate risk management

Theme	Outcomes	Per cent of effort
Improved climate forecasts	More certainty in climate forecasts for monthly, seasonal, annual, and inter-annual to decadal timescales	55%
Soil, climate and water resources—predicting availability	Australians have the knowledge to predict key attributes (e.g. soil moisture, frost, catchment runoff, wet season duration) over time and across landscapes as our climate varies and changes	15%
Agricultural and fisheries applications	Commodity-specific decision-support tools that identify benefits and opportunities for increased profitability and sustainability	15%
Knowledge, adoption and communication	Increased understanding and uptake of climate-related opportunities that benefit agriculture	15%
Improved and accessible datasets	Improved, quality assured, and readily available fundamental data sets	

Results from the CLIMAG reader survey

Many thanks to the 245 of you who completed our survey last month. We had no idea we had such a diverse readership—from farmers and natural resource managers to educators, librarians, researchers and the media.

We are taking your feedback to the Managing Climate Variability Program Management Committee meeting where we'll make the following suggestions:

1. Make CLIMAG also available by email as a pdf (40 per cent said you would like your paper copy in the post, but 37 per cent said you'd like a PDF by email).
2. Produce CLIMAG at least three times per year (60 per cent suggested producing it four times a year, but we'll start with three).
3. Make sure every issue of CLIMAG contains articles on the following most popular topics:
   - updates on Managing Climate Variability projects
   - expert views on seasonal forecasting tools such as models
   - stories about applying research on farm
   - stories about farmers managing climate risk
4. Include articles with more:
   - technical detail
   - climate change-related information
   - on-ground stories
   - regionally specific content
   - research updates
   - explanations of specific technical topics
   - farm management practice stories
   - up-to-date research

Thank you too for all your positive feedback.

Also, congratulations to the winner of the random prize draw—Hayley Morton from South Australia Water.

Managing Climate Variability

Project updates

The following table describes current projects. We will update you on the progress of the new projects in future CLIMAG editions.

Project title	Time	Summary of research objectives	Progress to date	Research contact
Improved seasonal climate forecast information on the internet	Sept 2007 – Dec 2008	Identify and develop a set of seasonal forecasting products to meet identified needs of farmers Provide maximum decision-support knowledge for Australia's climatic regions	Developed an interactive map of climate drivers, rainfall ranges plots, and ENSO wrap up available on www.bom.gov.au/WATL	**Dr Andrew Watkins** Bureau of Meteorology a.watkins@bom.gov.au
Improving seasonal forecasts for south-west Western Australia	April 2008 – May 2011	Increase the value of seasonal forecasts for farmers in south-west Western Australia	Currently exploring the use of and further development of coupled climate models	**Dr Senthold Asseng** CSIRO senthold.asseng@csiro.au
Scoping northern Australian seasonal climate knowledge R&D initiative	May 2008 – Oct 2008	Prepare a science plan (outlining opportunities, content and benefits) for increased climate science investment in northern Australia that benefits agriculture	Final report and plan in preparation	**Professor Roger Stone** University of Southern Queensland stone@usq.edu.au
Seasonal forecasting for eastern Australia scoping study	June 2008 – Dec 2008	Prepare a science plan (outlining opportunities, content and benefits) for increased climate science investment in subtropical eastern Australia that benefits agriculture	Draft report and plan in preparation	**Professor Roger Stone** University of Southern Queensland stone@usq.edu.au
Integration of climate-related decision-support system tools to improve their relevance	Nov 2008 – June 2009	Critically evaluate decision-support tools designed to support Australian grain growers Develop a decision-support investment strategy	New project	**Dr Zvi Hochman** CSIRO zvi.hochman@csiro.au
Critical thresholds and climate change impacts / adaptation in horticulture	Oct 2008 – Nov 2011	Investigate if exceeding temperature and other climate thresholds ('tipping points') will significantly change land use Investigate the resilience of farmers to adapt	New project	**Dr Peter Deuter** Queensland Department of Primary Industries & Fisheries peter.deuter@dpi.qld.gov.au
Assessing and managing heat stress in cereals	Oct 2008 – Sept 2011	Investigate the meteorology and climatology of heat events on the southern grains wheat belt	New project	**Dr Peter Hayman** South Australian R&D Institute hayman.peter@saugov.sa.gov.au
Assessing sugarcane production regional impacts of climate change and climate variability	Nov 2008 – Nov 2009	Determine how the sugarcane industry in the Mackay Whitsunday region can best meet the challenge of managing climate change and variability while also ensuring sustainable management of local and regional natural resources	New project	**Mr Will Higham** Reef Catchments (formerly Mackay Whitsunday Natural Resource Management Group) will.higham@reefcatchments.com.au
Extremes, climate modes and reanalysis-based approaches to climate resilience	Nov 2008 –June 2010	Facilitate seasonal forecasts of extreme events and identify potential impacts on agricultural operations for various locations	New project	**Dr Peter Best** University of Southern Queensland cindualpk@bigpond.com

Farmers seeking
complex climate information

A monthly newsletter communicating seasonal climate risk information to broadacre croppers is proving to be a winner in Victoria. The Victorian Department of Primary Industries (DPI) is continuing to fund *The Break* newsletter, which began as part of a project funded by Managing Climate Variability.

The Break provides information from Australian researchers about climate trends, explains various climate issues such as the Indian Ocean Dipole, the climate drivers in Victoria, and variation in rainfall over the last few years.

'Through feedback from our farmer groups and readers, we've learned not to shy away from the heavy technical topics. Lots of people want to increase their knowledge and improve their climate skills', said Chris Sounness from DPI.

The Break is targeted to grain growers, but Sounness hopes to extend it to other industries such as dairy, meat, wool and horticulture in 2009.

'Some of the articles are specific to south-eastern Australia. But the climate information is generally Australia wide—we now have over 1400 subscribers from all over Australia.'

Sounness and his DPI colleagues, De-Anne Price and Dale Grey, started the project (funded by Managing Climate Variability) to get climate science information flowing from the climate researchers to the broadacre communities.

Sounness said that the research team has learned that it is important to interpret the science in a way that is meaningful for farmers. For example, *The Break* highlights outputs from both climate and agronomic tools including Rainman, Pycal and Yield Prophet®.

'Climate information on its own is not as useful for making on-farm decisions as climate combined with details of soil moisture, nitrogen status and crop growth stage, for example', said Sounness.

Throughout the two-and-a-half year project, the team also shared their knowledge through presentations at farming meetings throughout Victoria and parts of New South Wales. In total they attended 500 agricultural meetings, farmer and shire group events, and presented to more than 6000 farmers.

'We didn't expect to be so popular. But people were motivated by the drought and wanted to understand climate variability and climate change. There was a big demand for information about variability and what drives it.'

Sounness said that it's important that farmers understand the oceans, the atmosphere and the relationships between them. And farmers agree, according to a survey last year run by Managing Climate Variability in conjunction with the Bureau of Meteorology.

'Farmers have told us that they want expert interpretations of global circulation models', said Colin Creighton, Managing Climate Variability Coordinator.

Carl Sudholz, Grains Team DPI Horsham

Looking at *The Break* newsletter with growers at Wimmera Machinery Field Days—Lance Hubener, David Boschen and De-Anne Price

'These models are a computer simulation of the world's atmosphere, ocean and land surface based on the laws of physics. We are investing in a new climate website that will give farmers access to interpretations of these forecast models by some of Australia's top climate scientists.'

In a separate survey, readers of *The Break* said they have improved their skills in interpreting seasonal climate information from the Bureau of Meteorology, historical climate, long-range weather forecasts, and the importance of sea surface temperature.

'We want to build up people's knowledge of these things so they have a baseline understanding of climate change', Sounness said.

Although the work proposed in the Managing Climate Variability project titled 'Building capacity in seasonal climate risk management in south-eastern Australia' wrapped up in June 2008, production of *The Break* and *The Fast Break* will continue through Victorian state funding under the Future Farming Strategy.

'The Victorian Department of Primary Industries recognises climate variability as an important part of their work.'

To download a copy of *The Break* climate risk newsletter, or *The Fast Break*, visit the Department of Primary Industries' website: www.dpi.vic.gov.au/climaterisk

To subscribe to either of the newsletters, **contact De-Anne Price,** deanne.price@dpi.vic.gov.au

Local farmers and advisors from three of Australia's dryland grains and mixed farming regions have a better understanding of the impacts of climate change and variability on their businesses, thanks to the collaborative project 'Communicating Climate Change'.

The future of communicating climate change

The Communicating Climate Change project has:

- delivered training and information through a two-phased process
- used workshops to train more than 65 farmers and advisors to be climate champions for their region
- provided information at forums to more than 650 farmers, agribusiness consultants and state agency personnel
- produced 32 fact sheets on topics including weather drivers for the regions, climate change projections, case studies and tools for adapting to climate change and variability, and how to reduce emissions

The project has also led to a series of follow-on events in Victoria, South Australia and Western Australia.

Managing Climate Variability worked with the Bureau of Meteorology, the Bureau of Rural Sciences, Meat & Livestock Australia and the Birchip Cropping Group to pilot the project in the:

- Wimmera Mallee region of Victoria
- medium rainfall zone of South Australia
- north-east region of the northern agricultural zone of Western Australia

Colin Creighton from Managing Climate Variability said the project was timely because of the huge farmer and agribusiness interest in climate variability and change.

'A key message coming out of the workshops and forums is that most farms using improved practices and responding appropriately to climate variability are likely to remain profitable and sustainable to 2030', said Creighton.

Alex Gartmann, CEO of the Birchip Cropping Group, said feedback from the workshops and forums showed that farmers and advisors want ongoing interaction with climate experts to help them adapt to climate change on their farms or to help others adapt.

'About one quarter of the farmers attending the forums were overwhelmed by the climate change and variability information provided to them', Gartmann said.

'They need one-on-one interactions with climate experts after the forums to get their specific questions answered and talk through their anxieties about climate change and variability.'

To help meet this need, Managing Climate Variability is developing a new climate risk management website to give farmers and advisors access to climate scientists and leading farmers in on-line discussion forums. The site, to be launched in 2009, will link visitors to the latest climate tools and information.

To build on the success of the Communicating Climate Change project, the project consortium is also seeking funding to help train more climate champions and run workshops and farmer forums in other regions in Australia.

Details of the workshops and farmer forums, including the information sheets developed for the project, are available on the Birchip Cropping Group site at:
www.bcg.org.au/cb_pages/Communicating_Climate_Change.php

For more information contact:
Colin Creighton
Managing Climate Variability
Phone: 02 6263 6086
Mobile: 0418 225 894
Email: colin.creighton@lwa.gov.au

National Agriculture Climate Change Action Plan:
www.daff.gov.au/natural-resources/climate
www.bcg.org.au/cb_pages/Communicating_Climate_Change.php

Peter Hayman talking about global warming at Balaklava Farmer Forum

Changing farm planning
to suit Western Australia's drier conditions

After a difficult couple of seasons in the North East Agricultural Region of Western Australia, Gary and Debbie Collins now accept increased climate variability in their region and are changing their farm planning to manage it.

'The statistics tell us that winter rainfall is decreasing. We're also used to getting 325 millimetres annually, but now we're more likely to get 270 to 280 millimetres', Gary Collins said.

Gary and Debbie Collins and their sons Jay and Brad have a mixed-farming business 160 kilometres south-east of Geraldton in Morawa. Their 3800-hectare farm is a dryland operation—mainly wheat, barley, oats and sheep. They also plant canola when the conditions are right.

'Scientists are telling us that our climate is getting drier; we have to factor climate variability into our thinking', Collins said. 'That's not to say that we walk away from the business; it comes down to being as confident with change in farming practices and technology as we can be and in reading the seasons and limiting what we do in order to be profitable.'

The family is taking a more conservative approach to their on-farm decision making.

'In 2007, we sowed crops in marginal moisture because we'd taken note of some longer range forecasts that didn't pan out', Collins said.

'The season was a failure, worst on record.

'Our view after going through that process is to evaluate the summer rainfall in conjunction with early autumn–winter rains with planting.

'It's about the best bottom line. We need to be more flexible in our planning.'

The Collins family don't put longer range forecasting into their early planning, preferring to wait and see what the season brings before they commit.

'We try to hold back some of our inputs like nitrogen and see what the season does. If it looks like it's going to be OK, we'll put more nitrogen on the crops.'

The family use stock in their planning and rotation—stock remove the crop residue and this stimulates seed production. Instead of killing weeds with herbicides, grazing stock can put more pressure on weeds that are resistant to herbicide. However, stock also reduce ground cover, and therefore moisture in the soil, which is a bigger problem with lower rainfall in the region.

'We know that if you leave the straw on the ground it improves soil moisture-holding capacity and the rain that falls doesn't run, it penetrates', Collins said.

'In the past, not cutting back our stock numbers early enough during the drought years has been detrimental to the operation.

'As we get into the harsher summer period, we have to recognise early if the stock are reducing groundcover too much. We also have to make sure we have enough to feed them if we do keep our stock in the feedlot.'

Assessing summer rainfall is critical to the family's decision-making process.

'For canola, if we don't have decent soil moisture at planting time we don't bother with it', Collins said.

'We are now evaluating what we have in the way of moisture and this drives our choices. It's not about "that's what's always been—that's what I'll do". I don't think we can operate like that anymore.'

The Collins family are actively involved in several networks including the Morawa Farm Improvement Group, the Mingenew–Irwin grower group, and the North East Farming Futures Group (NEFF).

'These networks give us access to climate information that will only get better as the science improves', Collins said.

'I also try to keep on top of the climate information that's out there through rural magazines, the Grains Research and Development Corporation and grazing publications.'

The Collins family have planted oil mallee trees to add extra vegetation to their landscape.

'These trees are hardy, can handle saline soils, produce oil, biomass and suck up carbon dioxide', Collins said.

The family is also involved with CSIRO trialling perennial grasses on the farm and are hoping this research will provide some different options for dryland farming systems.

'Farmers need to know there is light at the end of the tunnel, and that they have options based on scientific rigour', Collins said.

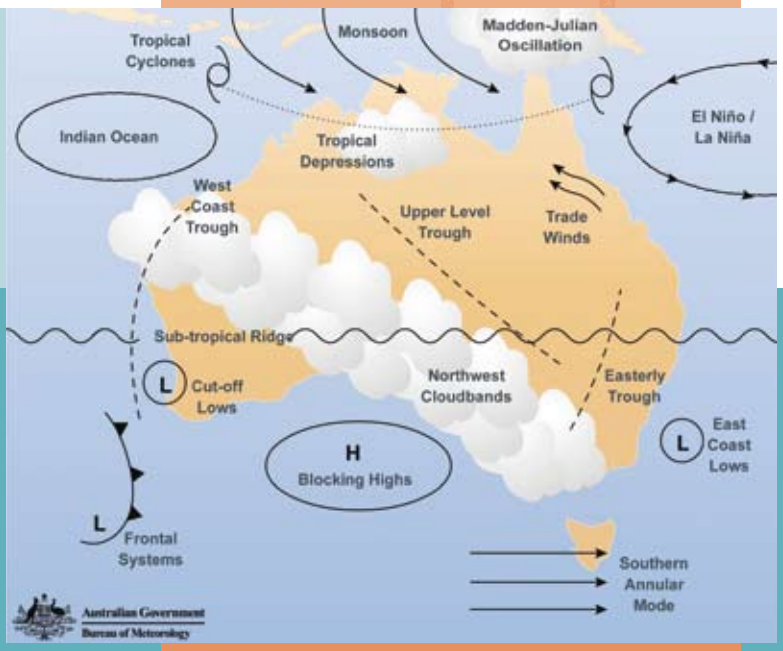
'The future of our next generation and beyond is paramount. Governments need to recognise this and continue to support research and development as this will allow our small rural communities to flourish and grow.'

What drives
Queensland's weather?

Look out for future articles in CLIMAG describing the drivers of Australia's weather on a state-by-state basis, starting with Queensland in this edition.

The major weather drivers in Queensland are:

- trade winds
- El Niño-Southern Oscillation
- tropical systems
- the inland trough
- cut-off lows and east-coast lows
- cloud bands
- frontal changes



Australia's major climate and weather drivers (Bureau of Meteorology)

Trade winds

The prevailing south-easterly trade winds collect moisture as they move eastward over the Pacific Ocean. They release this moisture as rain when they strike the Queensland coast and the Great Dividing Range. While the winds are present all year round, their impact is greatest from January to June.

El Niño-Southern Oscillation (ENSO)

ENSO is the oscillation between El Niño and La Niña conditions. El Niño is associated with extensive warming of the sea surface in the central and eastern tropical Pacific, and is often associated with below-average rainfall over much of eastern Australia. La Niña is associated with extensive cooling of the sea surface in the central and eastern tropical Pacific, and is often associated with above-average rainfall over much of eastern Australia.

Tropical systems

Tropical cyclones

Tropical cyclones are very intense, low-pressure systems that produce heavy rainfall, destructive winds and damaging storm surges. They have wind gusts in excess of 90 kilometres per hour around their centres; in the most severe cyclones, gusts can exceed 280 kilometres per hour.

Tropical depressions

Tropical depressions are moderate-strength, low-pressure systems often associated with the monsoon trough. They frequently produce significant rainfall and strong, gusty winds. They may develop into tropical cyclones.

The monsoon

The 'monsoon' is the seasonal reversal of winds that occurs over parts of the tropics. As the Australian summer approaches, the continent heats up. Low pressure is created, which draws the monsoon trough—a zone of low pressure and rising air—over northern Australia. This trough draws in moist air from the surrounding oceans, and this moist air rises to form widespread rain-bearing cloud.

The Madden–Julian Oscillation

The Madden–Julian Oscillation is a large-scale, slow-moving band of cloud that travels eastwards in the tropics. It moves around the globe along the equator, 'pulsing' roughly every 30 to 60 days. It influences the timing of the onset of the monsoon and the likelihood of tropical cyclones forming.

The inland trough

During the warmer months, the inland trough is a semi-permanent feature of the weather chart, located on the inland side of the Great Dividing Range and forming a boundary between moist coastal air and dry inland air. As temperatures rise, the trough deepens and moves towards the coast, often causing showers and thunderstorms to form to its east.

[continued on page 8]

[continued from page 7]

Cut-off lows and east-coast lows

Cut-off lows are low-pressure systems that break away from the main belt of low pressure that lies across the Southern Ocean. They are associated with sustained rainfall and can produce strong, gusty winds and high seas. If a cut-off low is slow-moving or near-stationary, rainfall may occur for extended periods and may be heavy at times. East-coast lows are a type of cut-off low that occur off the east coast of Australia, on average several times a year.

Cloud bands

Cloud bands are often key contributors to widespread rain over central and southern Queensland in autumn and early winter. They can form across Australia when a trough of low pressure occurs in the upper levels of the atmosphere, or when warm, moist tropical air originating over the Indian Ocean moves towards the pole (generally south eastward), and is forced to rise over colder air in southern Australia.

Frontal changes

The arrival time of a cold front or south-east change in south-east Queensland is critical to the development of thunderstorms. The part of a south-east change that is over land will often merge with the inland trough. The part that is near the coast is turned north by the Great Dividing Range, reaching the Queensland coast as a northward-moving wind change.

For more information, visit the Bureau of Meteorology:
www.bom.gov.au/watl/about-weather-and-climate/australian-climate-influences.html

Contact Jeff Sabburg
Queensland Climate Services Manager
Bureau of Meteorology
Phone: 07 3239 8660

Our thanks to the Queensland Farmers' Federation who commissioned this work with the Bureau of Meteorology.

GRDC Grains Research & Development Corporation
mla MEAT & LIVESTOCK AUSTRALIA
DAIRY AUSTRALIA Delivering for the dairy industry
Australian Government
Department of Agriculture, Fisheries and Forestry
Land & Water Australia
Rural Industries Research and Development Corporation
Sugar Research and Development Corporation

Managing Climate Variability is a collaborative program between the Grains, Rural Industries and Sugar Research and Development Corporations; the Australian Government through the Department of Agriculture, Fisheries and Forestry; Dairy Australia; Meat & Livestock Australia; and Land & Water Australia.

Econnect Communication provides communication support to MCV.
www.econnect.com.au
Phone: 07 3846 7111
Email: admin@econnect.com.au

CLIMAG Edition 16, January 2009
ISSN: 1441-7987
Product code: PN22056
Editing and publication coordination: Econnect Communication
Design: See-Saw Illustration and Design

Printed on a waterless press using vegetable-based inks, on environmentally responsible paper independently certified by the Forest Stewardship Council. The FSC trademark identifies products which contain fibres from well managed forests certified in accordance with the rules of the Council — the global benchmark for responsible forest management.

Printer to place FSC logo here

Program contacts

For more information on Managing Climate Variability, visit www.managingclimate.gov.au

Land & Water Australia is the managing agent for MCV.

Land & Water Australia
Level 1, 86 Northbourne Avenue,
Braddon ACT 2612
GPO Box 2182, Canberra ACT 2601
Phone: 02 6263 6000
Email: managingclimate@lwa.gov.au

Program Coordinator: Colin Creighton
Phone: 02 6263 6027 and 0418 225 894
Email: colin.creighton@lwa.gov.au

Subscribe to CLIMAG

To subscribe to CLIMAG, MCV's free newsletter, visit
www.lwa.gov.au/subscription_form.asp