Australian Government
Department of Agriculture, Fisheries and Forestry
ABARES

final report

Project Code: B.COM.0288

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Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Date published: June 2012

PUBLISHED BY
Meat and Livestock Australia Limited
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NORTH SYDNEY NSW 2059

RPGOT Maintenance Contract

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

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Contents

Summary

ABARES has been maintaining the dynamic content and source data for the MLA Rainfall to Pasture Growth Outlook Tool (RPGOT) since October 2005.

RPGOT is a web based decision support tool available via the MLA website and provides an outlook for up to three months into the future, for over 3,300 locations across southern Australia. The tool assists producers to make better pasture and grazing management decisions by estimating pasture growth in relation to rainfall, soil moisture and other climatic conditions.

This project was established to ensure the ongoing maintenance of this dynamic content and source data which underpins the smooth and accurate running of the MLA Rainfall to Pasture Growth Outlook Tool.

This report outlines the ongoing maintenance undertaken by ABARES as described in the project contract.

1 Introduction

The Rainfall to Pasture Growth Outlook Tool (RPGOT) is a decision support tool available via the Meat & livestock Australia (MLA) website that uses a pasture growth model and ABARES statistical models to provide access to current and forecast rainfall, soil moisture and pastures growth rates for more than 3300 sites across southern Australia. It was developed in 2005 by the former Bureau of Rural Sciences (BRS) and has been one of the technical information and management tools promoted through the MLA extension programs.

This project was established to ensure the ongoing maintenance of this dynamic content and source data which underpins the smooth and accurate running of the MLA Rainfall to Pasture Growth Outlook Tool.

This report outlines the ongoing maintenance undertaken by ABARES as described in the project contract.

2 Rainfall to Pasture Growth Outlook Tool

The RPGOT provides a set of complementary outputs that can be used in conjunction with other sources of information to improve tactical and strategic on-farm decision-making. The underlying pasture growth model, GROWEST, uses weekly solar radiation, temperature and available soil moisture (derived from rainfall and soil type data) to estimate a dimensionless plant growth index. The index presents plant dry matter production as values ranging between zero (completely limiting conditions) and one (non-limiting conditions).

The first section of RPGOT outputs, the ‘Station Description’, provides users with graphs of annual rainfall, pasture growth and soil moisture patterns. This part of the tool can aid strategic decision-making by giving producers historical trends of rainfall and related seasonal pasture growth for their location. Joining, calving, turn-off times and other long-term planning decisions is supported at a regional scale.

The second section of RPGOT outputs contains up-to-date graphs of weekly rainfall, pasture growth and soil moisture with a three-month outlook. These graphs can be used to identify trigger-points and indicate the likelihood of possible future pasture growth. They provide an indication of the feed likely to be on offer to support tactical management of, for example, stocking rates, herd condition and supplementary feeding.

The current outputs of the RPGOT have been developed in consultation with producers. In particular, the depiction of the reliability of the outlook component was designed to enable users to clearly identify what the confidence of the forecast system is at any given point in time. As with most other risk management tools the RPGOT may not make a difference every season but it can help producers improve their overall decision-making and their profitability, particularly in years of above or below average conditions.

3 Project objectives

The objectives of the project are to:

provide server infrastructure, maintenance and support for the dynamic content of MLA Rainfall to Pasture Growth Outlook Tool website;

monitor (at least twice weekly) the website to ensure that data are current and use its best endeavours to ensure the data are correct;

update ABARES version of the SILO Patched Point Database (SILO PPD) upon the issuing of data updates to the SILO PPD by Queensland Department of Department of Environment and Resource Management (DERM) or on an as required basis and recreate the site list, site description and map select functionality;

perform minor programming changes (including improving the robustness and monitoring of the weekly data loads); and

provide project management and coordination services.

4 Maintenance services

During the contract period 1 July 2011 to 30 June 2012, ABARES has provided all services specified under the ABARES Rainfall to Pasture Growth Outlook Maintenance Contract. ABARES has delivered the routine and non-routine maintenance activities specified below.

5 Routine maintenance

ABARES has:

downloaded data from the Queensland Department of Department of Environment and Resource Management (DERM) SILO PPD dataset on a weekly basis;

processed SILO PPD data to prepare it for input into the Growest model;

ran the Growest model to generate pasture growth data and forecast charts for each rainfall station in the dataset;

transferred processed data and charts to the server which hosts the MLA website on a weekly basis via an ftp link;

made available a web mapping service (WMS) providing an interactive map displaying rainfall station locations (This effectively means that the WMS is hosted on an ABARES server. The Rainfall to Pasture Growth Outlook website, hosted and maintained by MLA, connects to the mapping service and displays resulting map images);

monitored and maintained the RPGOT functions, and reported on performance and availability;

investigated and (where appropriate) resolved delivery issues with DERM, Bureau of Meteorology (BoM), ABARES systems or downstream MLA systems; and

implemented minor changes to accommodate BoM, DERM or MLA system changes.

6 Non-routine maintenance

ABARES has:

recompiled its version of the SILO PPD following the release of new SILO PPD baseline by DERM;

collaborated with the BoM to ensure ongoing delivery of an appropriate SST phase scheme for the RPGOT;

checked and updated applications following introduction of new baseline data; and

developed and implemented updated diagnostic services.

7 Results

8 Maintenance

All delivery issues identified in the RPGOT for the period 1 July 2011 to 30 June 2012 were addressed and fixed, where possible, within 48 hours or less following identification or notification. A list of delivery issues resolved by ABARES is listed below:

ABARES negotiated and purchased a user licence for the SILO PPD managed by DERM in July 2011, to support the ongoing delivery of data products to MLA.

On 8 September 2011, MLA notified ABARES that the data updates for the RPGOT had not successfully completed during August 2011. ABARES diagnosed the cause of the problem as a breakdown in the delivery of the seasonal forecast component of the analysis from the Bureau of Meteorology (BoM), which was not allowing results to be generated beyond the start of August 2011. ABARES diagnosed and corrected the problem within 24 hours of its initial notification.

Following the breakdown in the delivery of the seasonal forecast component of the analysis from BoM, ABARES altered its routine monitoring to encompass the publishing of sea surface temperature phase information by BoM. During the period September to December 2011 ABARES was required to manually update these values. ABARES is currently collaborating with BoM to ensure a continued automatic delivery of this information.

DERM advised ABARES that they would be changing the location of their SILO File Transfer Protocol (FTP) server in September 2011. ABARES completed necessary changes to the servers to ensure continued delivery of data.

In October 2011, ABARES monitoring protocols detected that updates published by the silo patched point database failed. On investigation of the incident ABARES discovered that due changed made on the SILO FTP server, the update PPD script failed to establish a link with the SILO FTP server. ABARES liaised with DERM to re-establish this link. DERM subsequently completed the required changes, which resolved the problem without further incident.

Publishing of new data for some stations was interrupted in December 2011. ABARES was notified of the problem on 24 January 2012, with the issue resolved with the next 48 hours.

In February 2012, ABARES was notified that a number of stations had not been updated since July 2011. On investigation of the incident ABARES discovered that DERM had been publishing incomplete data updates for all stations beyond a certain station number. ABARES monitoring protocols detected that updates had been published by DERM, however they failed to recognise that the data updates were incomplete. ABARES liaised with DERM to rectify the incomplete data updates within 24 hours of its initial notification. Complete data records were then incorporated into ABARES servers and a manual run of the RPGOT model was initiated to provide MLA with the earliest possible station data update, which resolved the problem without further incident.

On 21 May 2012, MLA notified ABARES that the data updates for the RPGOT were not successfully completed during the second week of May 2012. ABARES diagnosed the cause of the problem as a breakdown in the delivery of the seasonal forecast component of the analysis from the Bureau of Meteorology (BoM), which was not allowing results to

be generated beyond the 7 May 2012. ABARES diagnosed and corrected the problem within 24 hours of its initial notification.

9 Non-routine maintenance

Over the course of the 2011-12 maintenance period, there have been numerous interruptions in the delivery of sea surface temperature phase information from the Bureau of Meteorology (BoM), which has delayed the delivery of updated data files to RPGOT. As reported in the *Maintenance* section above, ABARES has been working closely with BoM to ensure a continued and consistent delivery of this information into the future.

Discussions with BoM have highlighted that the current SST phase scheme used by ABARES to derive the rainfall, soil moisture and pasture growth outlooks is based on research and methodologies now being phased out. This phase scheme is made up of two ocean temperature modes, or components, that describe temperature patterns across the Indian and Pacific Ocean. These components are SST1, which describes sea surface temperatures in the Pacific Ocean; and SST2, which describes sea surface temperatures in the Indian Ocean. These two components effectively capture two climate drivers for the Australian region, the El Niño Southern Oscillation (ENSO) in the Pacific and the Indian Ocean Dipole (IOD) in the Indian Ocean

The Bureau of Meteorology transitioned from SST1 as an ENSO indicator to an index known as Nino 3.4 during 2010. There are a range of reasons for this transition. The components SST1 and SST2 capture climate modes across both the Indian and Pacific Ocean basins based on 20th century data. For these modes to provide adequate predictive skill for future climatic conditions, a degree of stability in the modes over the 21st and 20th century is assumed. However, due to warming trends in both the Indian and Pacific Oceans, the modes have not been stationary, but changing over time.

For this reason, the Bureau of Meteorology will transition to a dynamic (climate model) predictive scheme that is not based on historical relationships alone. The full transition to dynamical prediction is expected in the next 12 to 24 months. In the interim, the Bureau of Meteorology believes that Nino 3.4 is a more robust indicator of ENSO activity in that it is less affected than SST1 by broadscale temperature changes in the Pacific Ocean.

Until recently the BoM was not planning to update the phase scheme to reflect these changes. However, following discussions, ABARES has provided funding to the BoM to research and update the scheme for future delivery. In the near future, the BoM will release a new phase scheme using the original sea surface temperature measures in the Indian Ocean (SST1) and the current operational sea surface temperature measures in the Pacific Ocean (Nino 3.4).

Once released ABARES will validate the new scheme to ensure that it does not compromise/vary the past outputs from the RPGOT, establish a service delivery MoU with the BoM and in consultation with MLA, incorporate the new phase scheme to provide an ongoing and improved seasonal outlook scheme and outputs. To achieve this MLA and ABARES will need to establish a new contract arrangement for the ongoing maintenance of the RPGOT.

10 Ongoing Maintenance

Over the past seven years MLA has made a significant investment to establish a decision support tool (RPGOT) that delivers online access to current and forecast pasture growth information for more than 3300 locations across southern Australia and to maintain the dynamic content and source data which underpins the RPGOT.

The establishment of the RPGOT website is part of MLA's long-term strategy to provide meat producers with a range of tools and calculators to assist in making decisions in their businesses. To ensure that this investment continues to benefit future users the dynamic content and source data which underpins RPGOT will need to be maintained and updated.

ABARES has put significant additional effort into ensuring the continuity and quality of the system through collaboration with organisations such as the BoM for the SST phase data, and DERM for the patch-point data. Without this collaboration the RPGOT would cease to function effectively. ABARES intends to continue to collaborate with organisation such as the BoM to establish MoUs for the continued delivery of the SST and patch-point data sets into the next financial year. To achieve these outcomes and to maintain the integrity of the system a new maintenance contract needs to be established for the 2012-13 financial year.

11 Future opportunities

12 Re-development of the RPGOT

During the maintenance period 1 July 2011 to 30 June 2012, ABARES has outlined and discussed a proposal for the possible re-development of the Rainfall to Pasture Growth Outlook Tool. The proposal resulted from the MLA Project No. B.COM.1049 'Market research for future development of the Rainfall to Pasture Growth Outlook Tool (RPGOT)'. Through this project, ABARES undertake a scoping study titled 'Improving the Rainfall to Pasture Growth Outlook Tool (RPGOT)', to inform the re-development of the RPGOT. The final report for this scoping study was provided to MLA on 1 June 2011.

The report identified that the development of a freely available support tool that provides pasture growth information through a simple and intuitive platform would provide a valuable addition to existing sources of information that support decision-making in the livestock production sector.

The report identified three main components of a new web application and recommended three options incorporating these for the re-development of the RPGOT. The three components are:

The Sustainable Grazing Systems (SGS) pasture model;

An updated web application to replace the existing Rainfall to Pasture Growth Outlook Tool (RPGOT); and

A customised email service to provide farmers with regular updates based on individual profiles.

The key user benefits which can be achieved by the proposal include:

a more detailed and accurate pasture growth model;

an easier-to-use website, including better map functionality;

an enhanced web services;

standard outputs from the SGS model across Australia;

users having the option of registering and requesting customised SGS model outputs, to be delivered by email; and

users receiving regular updated pasture growth information, directly to their email address.

The proposal details the development of the above web services and their incorporation into a new Meat and Livestock Australia (MLA) hosted web application, to provide access to outputs from the Sustainable Grazing Systems (SGS) pasture model for MLA and its stakeholders.

13 Improved seasonal forecasting

The outlook component in the RPGOT is based on climatic conditions experienced during historical analogue years. These analogue years are identified as those years which have

experienced similar Sea Surface Temperature (SST) values as the present. This provides the system with a statistical climatic forecast.

Historical analysis has shown that statistically based seasonal forecasting systems often provide only moderate value to the agricultural community at certain times of the year and recent analysis suggests that their skill and utility is likely to diminish further due to a changing climate. While the future of seasonal forecasting lies in the use of so-called dynamical (sometimes called physical) models, real advances in this area of research are still some time away.

As mentioned in the *Ongoing Maintenance* section above, ABARES has been working with the Bureau of Meteorology to develop a new phase scheme which will form the basis of an improved statistically based seasonal forecasting systems. The incorporation of this new phase scheme into RPGOT, will providing improved statistical forecasts for RPGOT, until a more accurate dynamic seasonal forecasts are available.

It is anticipated that outputs from some of the BoM's experimental dynamic models may become available over the next financial year. Following analysis for suitability and validation of these outputs, once they become available, it might be possible to consider how the more dynamic forecasts could be incorporated into the RPGOT or another pasture growth tool.

14 Conclusions

The contractual arrangement between ABARES and MLA to maintain the dynamic content and source data for the MLA Rainfall to Pasture Growth Outlook Tool (RPGOT) is due to expire on 30 June 2012. While MLA explores options for the possible re-development of the Rainfall to Pasture Growth Outlook Tool, a new agreement should be entered into with ABARES for the 2012-13 financial year, to ensure the ongoing maintenance of the dynamic content and source data for the MLA RPGOT.

Due to the uncertainty surrounding the ongoing delivery and the appropriateness of the current sea surface temperature phase information from the Bureau of Meteorology (BoM), MLA should consider the incorporation of a new phase scheme into RPGOT. ABARES believes that the new phase scheme developed in collaboration with BoM will provide improved statistical forecasts for RPGOT, until more accurate dynamic seasonal forecasts are available.

A redeveloped RPGOT could theoretically contain any or all of the key user benefits outlined in this report. As each feature requires a level of investment, consideration needs to be given to those features that have the highest priority in terms of user requirements. In developing the recommendations in ‘Improving the Rainfall to Pasture Growth Outlook Tool (RPGOT)’, the user requirements assessed as a priority were carefully balanced against the investment required for each.

In that report ABARES recommend that MLA continues to progress opportunities to re-develop of the RPGOT to deliver a freely available support tool that provides pasture growth information through a simple and intuitive platform which supports decision-making in the livestock production sector.