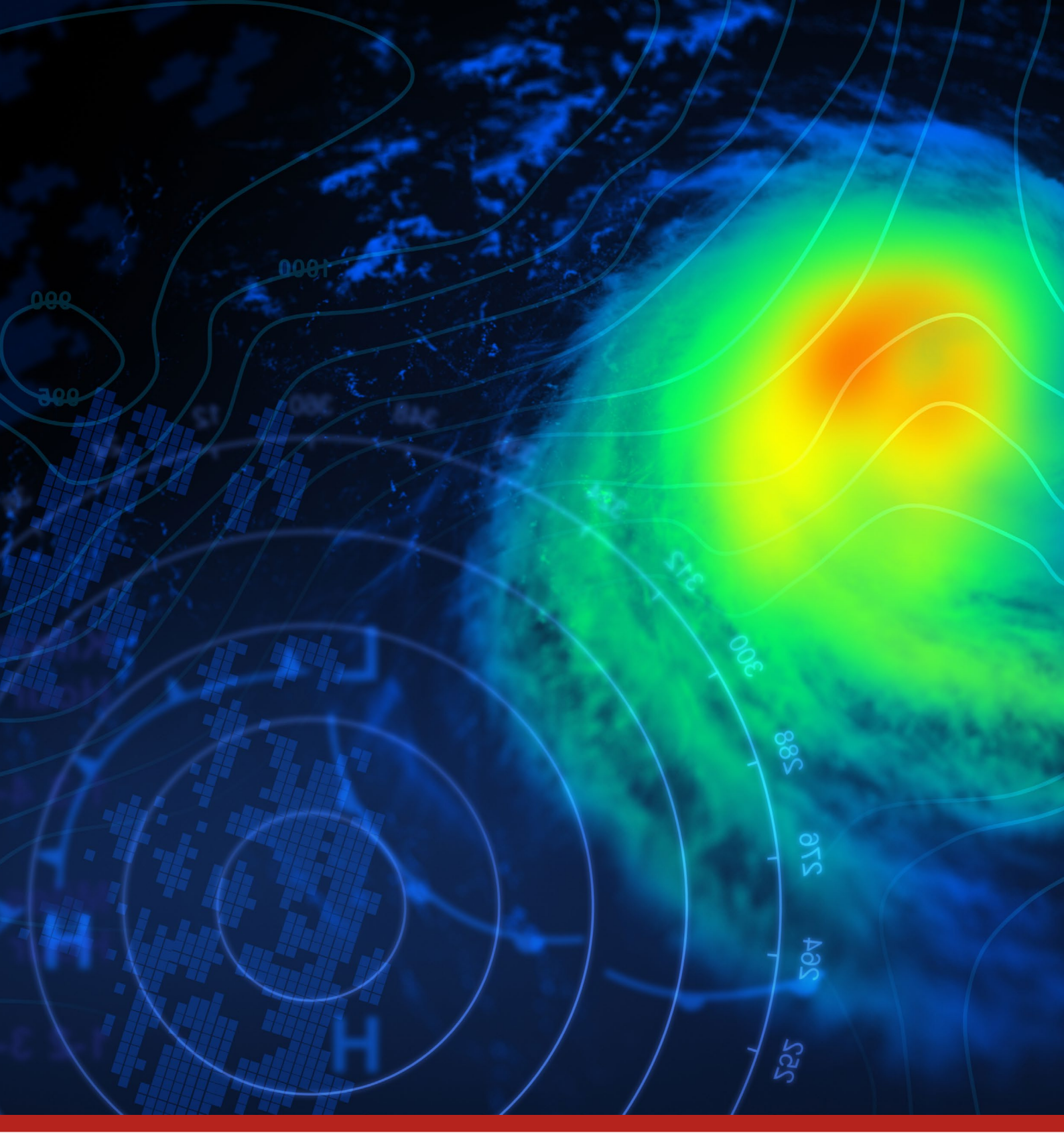

Rural R&D for Profit program
Final Report
Improved use of seasonal forecasting to increase farmer profitability

AgriFutures™ Improved Seasonal Forecasting

Appendix 7

APPENDIX 7

Matrix of key issues raised during user workshops.

Final and updated matrix of assessment of key issues raised during in-depth user workshops that are either currently addressed or not being addressed in current seasonal climate forecast outputs along with listing of relevant key climate forecast systems.

ENTERPRISE	KEY DECISIONS	RELEVANT WEATHER, INTRA-SEASONAL AND SEASONAL CLIMATE SYSTEMS	TIMING
NORTHERN GRAZING	Decisions on stock numbers to be carried for the season are made March-May. If the grazing and herd is being managed well, getting average to 20% below average rainfall for summer is no problem.	Seasonal forecasts for summer with as much long-lead time as possible (ENSO or otherwise). ACCESS-S may prove useful for this longer lead time need. **POAMA 2.4 already has some of this capability, especially during ENSO periods. ECMWF appears to provide useful forecast skill for western and north-western graziers**.	March-May
	What people need to know is the chance of getting 50% below, 70% below etc. A forecast for the next 3, 6, 9 months is useful. Rain in the dry season in the Kimberley is useful for grass growth.	Change in forecast terminology may be warranted.	July-September

	Weaning in May-June needs to be changed in response to seasonal conditions and good forecasting could play a role in planning. A skilful forecast issued in May-June for the next 9 months would be very useful for deciding on having only 1 Round of mustering, resulting in large savings in labour and mustering costs.	Seasonal forecast for winter is still useful. **Long-lead seasonal forecasting seems to hold the key to decisions in this far northern zone. Suggest POAMA 2.4 and ECMWF will provide useful outcomes.**
	Sell in Aug-Sept if outlook is dry and if animals are in suitable condition. Forecast for next 3-6 months is useful. Make plans for further selling if outlook is dry. Round 3 muster in Oct - sell if outlook is dry and animals are in poor condition.	Long-lead seasonal forecasts for the summer season very valuable. All seasonal climate forecasts can provide this during ENSO periods. **The UKMO GLOSEA5 system may be valuable for this need.** Forecast of the start of the wet season and end of wet season and use of MJO-based forecasts especially valuable. The sts sub seasonal forecast system may assist significantly here.

		Sub-seasonal – monthly forecasts provided as a component of ACCESS-S will be especially useful. Long-lead seasonal forecasts for the summer season very valuable**. GLOSEA, ECMWF, ACCESS-S and POAMA 2.4 will all provide valuable information.**	
NORTHERN GRAINS - PULSE/CHICKPEAS	**Crop and variety selection**. High GM $/ha on chickpeas and fababean - does this over-ride normal paddock crop rotation - implications for disease/ascochyta, phytophera, sclertinia, viruses etc. Weed control - persistence of summer weeds into winter due to later start to winter season. Decision to bait mice prior to planting. Nitrogen application rates and Wheat variety selection.	In-fallow and/or summer rainfall - drives soil moisture profile for winter cropping. Also informs decisions such as on row spacing (e.g. chickpeas from 50 to 100cm) and fertiliser application. **POAMA 2.4 and potentially the UK Met Office GLOSEA5 system should provide useful outputs**. . SOI phase a useful back up. Early to mid-crop growth and establishment. MJO timing and strength - planting opportunities. **ENSO forecasts – use of sea surface temperature forecasts from BoM, ECMWF, UK Met Office and US Climate Prediction Center.** This determines	Seasonal forecasts for winter needed earlier than currently available (need winter forecasts in April or early May rather than in mid-May or June).

		what is likely to occur with implications for crop finish - wet/dry and disease and/or insect implications. Frost - likely finish period that is also associated with ENSO. Key requirements summary: ENSO outlook updated at least monthly. Rainfall and temperature over the coming seasons - forecast using ENSO forecasts through BoM, ECMWF, UKMO and US CPC. Frost forecasts (date of last frost and numbers of frosts) are currently only available using SOI phases (e.g. longpaddock.qld.gov.au).	
	Forecasts of frost over the season and date of last frost		
NORTHERN GRAINS - CENTRAL QUEENSLAND	Northern workshops - decision to plant dryland summer crop (cotton, sorghum). Irrigated crops - area to plant reflecting availability of water. Southern workshops - crop and variety	In-fallow and/or winter rainfall - drives soil moisture profile for cropping. Producer feedback indicated soil moisture profile at time of sowing as not as important as for winter cropping as there is increased potential for in-crop rainfall during summer.	Seasonal forecasts for winter needed earlier than currently available (need winter forecasts in April or early May rather than in mid-May or June) .

	selection - (forage or grain), cotton, pulses. Timing of sowing.	Does help decisions regarding crop selection, opportunity cropping and crop rotations. **POAMA 2.4 now appears to be the most reliable forecast system**, although SOI phase still used and regarded as valuable in decision making in ENSO years. Key is to use forecasts in ENSO periods to provide- %chance of xx mm rainfall to ensure early to mid-crop growth and establishment. **MJO timing and strength - planting opportunities.** **ENSO forecasts from - BoM, ECMWF, UKMO and US CPC to provide an overview** of what is occurring and implications for crop finish - wet/dry and disease and/or insect implications. Summary of key seasonal and intra-seasonal forecast needs required: **Seasonal or longer forecasts of ENSO and/or seasonal rainfall and temperature through GCMs (BoM, ECMWF, UKMO and US CPC).** **As early as possible (April or mid-May rather than early June).**

		Relevance of MJO at these latitudes needs further work as this aspect appears to influence decisions related to timing of planting and harvesting. See BoM sites for MJO forecasts.	
NORTHERN GRAINS - DARLING DOWNS (SUMMER CROPS)	Decision to plant dryland summer crop (cotton, sorghum predominately). Irrigated crops - area to plant reflecting availability of water. Also issue of whether to persist with managing disease and pest load in chickpea crop. Drier finish and harvest period would help maximise available high returns. Timing of sowing.	In-fallow and/or winter rainfall - drives soil moisture profile for cropping. Producer feedback indicated soil moisture profile at time of sowing is not as important as for winter cropping as there is increased potential for in-crop rainfall during summer. Helps decisions regarding crop selection, opportunity cropping and crop rotations. **This more recent analysis suggests POAMA 2.4 forecasts should provide useful forecasts for these decisions. SOI phase can be used as a back-up but suggest restrict to only ENSO periods. - Rainfall forecasts are required to ensure early to mid-crop growth and establishment.** **MJO timing and strength - planting opportunities.**	October-April

		ENSO forecasts from BoM, ECMWF, UKMO and US CPC. **To provide information on what is generally occurring and**: implications for crop finish - wet/dry and disease and/or insect implications. Summary of requirements: Seasonal summer forecasts of rainfall and temperature plus: Seasonal forecasts of the seasonal risk of hail (high/medium/low). **Use of and value of the MJO seems to be important (obtain from BoM): quantification of the impact and value of the MJO at these latitudes needs to be better quantified**.	
SUGAR AND ASSOCIATED ROTATION CROPS	Time of fertilising Conservative forward pricing	Use of MJO highlighted.	Autumn/winter: March onwards
	Starting of sugar crushing	Use of MJO highlighted.	Autumn/winter
	Planting in front/back of an MJO event	Use of MJO highlighted.	Summer

	Use of ripeners for longer season length		
	Ratooning – Plough out ratoon	Seasonal forecasts, especially of over-wet conditions – Forecasts of La Nina critical,	Winter
	Harvesting rotation	position of the sub-tropical Ridge during winter and spring potentially magnifying impact of La Nina also critical.	
		Seasonal forecasts of extreme low minimum temperatures	
	Planting rotation	Seasonal forecasts of wet conditions critical – included number of wet days above critical amounts.	
	Nitrogen management – use inhibitors if a wet forecast	Seamless forecasts covering weather, intra-**seasonal and seasonal climate critical.**	
	Weed management – more in a wet year	**Forecasts of critical temperature ranges (ACCESS-S should provide this).**	
	Block rotation and the area of rotation		
	Planting and harvesting timetables. In a dry year leave better yielding blocks until	Risks of rainfall being in the highest categories (e.g. top 20% of values). More targeted forecasts critical.	

	later. Wet year changes decisions		
		Seasonal forecasts critical.	
	Fertiliser application. Decision to use Entec use (20% higher $) (slow release), or use of 'normal' fertiliser	Seasonal forecasts of local and also international (e.g. Brazil) critical.	
	Pricing of sugar on the market. Feb 24th locking in of sugar lots on world market. Look at what Brazil crop is doing and associated rainfall events	**Multi-year forecasts (NCAP project) would be highly valuable for more strategic decisions**	May to Nov in the north. Sept/Oct in the south (Bundaberg/Childers).
	Diversification. Rice etc.	If 'wet' forecast avoid over investment in irrigation, infrastructure (e.g. pumps, piping and other equipment) that won't be used to its potential as it would be in a drier season.
	Irrigation systems	Leasing extra water: Buying more water earlier in the season before it becomes expensive if the season ahead is likely to be dry.
		Irrigation scheduling. If wet crushing expecting then apply less close to harvest.

	Irrigation management around crop water needs.
	Irrigation infrastructure investment: new pumps, spears, pipelines.
	Irrigation scheduling
	Irrigation allocation
	Irrigation infrastructure maintenance, upgrading and investment.
	If season is going to be wet, make sure gear is well maintained and up to the irrigation demand.
	Irrigation electricity tariffs.
	Change to cheaper tariffs depending on the expected electricity usage.
	Electricity usage would be higher in a forecast dry season than a forecast wet season.
	Tariffs could be changed accordingly depending on forecast usage.
	Irrigation scheduling using MJO –Water early if longer term forecast is 'wet', if dry, water in between passage of MJO.

		Irrigation – Invest in alternative equipment than irrigation if the season ahead is likely to be dry. Purchasing more water allocation, if dry season is expected.	
PEANUTS – SOUTHERN QUEENSLAND	Planting Peanuts: Determining best time to plant peanuts. Early November plant may lead to a wet harvest in March if wet La Nina conditions occur. Early December plant, with harvest in mid-April may be safer in a wet year. Planting operations generally throughout the year.	**Seasonal risk of rainfall being in the highest 20% of climatological values. POAMA 2.4 should enable this improved decision making**.	Summer and Autumn
SOUTHERN BEEF NSW – HOLBROOK	How many weaners to sell in March. Also links to key antecedent conditions in regard to cash-flow, weaner price, and available feed at the time.	Rainfall in the forthcoming March to May period. ENSO, SAM, IOD – based systems – **However, this could fit well into POAMA 2.4 and ACCESS –S outputs, especially given the otherwise poorer predictability capability during this time of the year**	March in any given year
SOUTHERN BEEF - NSW – HOLBROOK	How many weaners to sell in January (beef industry)?	Rainfall in the forthcoming January to March period.	January in any given year.

	(Hence how many weaners to keep over winter to sell as steers/ heifers). Important antecedent conditions include current cash-flow, weaner prices and available feed	Requirements fit the current ENSO forecasting systems well. **Links to ACCESS valuable and possibly POAMA 2.4 outputs**.	
SOUTHERN LAMB NSW – HOLBROOK	How many lambs to sell (lambing industry)? Antecedent conditions include available pasture supply and both stock and grain prices.	Rainfall in the forthcoming November to February period. **ENSO and other well tested systems fit easily into this decision. ACCESS-S should also pick this up.**	November in any given year.
SOUTHERN DRYLAND COTTON INDUSTRY BUNGUNYA REGION – SOUTHERN QUEENSLAND BORDER REGION.	What area of cotton to plant (dryland cotton industry). What row spacing to apply in dryland cotton planting (e.g. single skip rows; double skip rows, etc.)?	Rainfall in the forthcoming November to February period. ENSO and other well tested systems fit easily into this decision. **POAMA 2.4 and ACCESS-S should pick this up as should the SOI during ENSO periods**.	November in any given year.
SOUTHERN WINTER CROPPING BIRCHIP – MID VICTORIA REGION	What area of canola to sow? Important antecedent conditions include Soil moisture levels and whether sowing	In-crop growing rainfall April to October. ENSO and SAM/IOD based systems plus sub-tropical ridge forecast based systems would apply. **POAMA 2.4 and ACCESS-S should well be able to**	April in any given year

	rains have already occurred.	**synthesise these systems into useful outputs.** April forecast requirement would normally be regarded as within the autumn predictability gap period but POAMA 2.4 and ACCESS may be able to overcome this issue.	
SOUTHERN WINTER CROPPING BIRCHIP REGION	How much in-crop nitrogen to spread? Important antecedent conditions include cash-flow, soil nitrogen levels and soil moisture levels. Similar decisions are common throughout the entire eastern Australian cropping system.	July to October rainfall. All known seasonal climate forecast systems (e.g. ENSO/SAM/IOD /sub-tropical ridge influences) should be able to assist this decision. **POAMA 2.4 and ACCESS-S** may be able to combine and facilitate this need.	July in any given year.
WESTERN WINTER CROPPING: BURRACOPPIN, SOUTH WEST WESTERN AUSTRALIA	Important forward selling issues: "What percentage of my wheat crop will I forward sell"? Antecedent conditions include (global) wheat prices and soil moisture conditions	In-crop growing rainfall April to October. Suggest this would be a major challenge. ENSO and SAM/IOD based systems plus sub-tropical ridge forecast based systems may apply. **Suggest GLOSEA 5 and ECMWF be trialled as well as ACCESS-S that may well**	April in any given year.

		be able to synthesise these systems into useful output. SOI phase appears useful in ENSO periods and years. **ENSO forecasts available from UK Met Office, ECMWF, BoM, UC Climate Prediction Center (see web site information below).** April forecast requirement would normally be regarded as within the autumn predictability gap period but **ECMWF, GLOSEA5 and ACCESS may be able to overcome this issue**.	
WESTERN WINTER CROPPING: BURRACOPPIN, SOUTH WEST WESTERN AUSTRALIA	What percentage of my crop will I forward sell (2)? Important antecedent conditions include wheat prices and soil moisture conditions.	August to October rainfall forecast needed. Suggest common use of ENSO-based indicators plus sub-tropical ridge information may be valuable. **ECMWF, GLOSEA5 and ACCESS may be able to overcome this issue for this difficult to forecast region.**	August in any given year.
RICE INDUSTRY - DENILIQUIN, SOUTHERN NSW	When to drain a paddy in the rice industry. "When will I drain my paddy"?	Interesting need for a short term, three-week forecast of evaporation levels. **ACCESS-S (and similar sub seasonal to seasonal)**	Late March in any given year.

	Important antecedent conditions including the need to target soil moisture at harvest and assess grain moisture levels	**multi-week weather forecast systems may well apply here.**