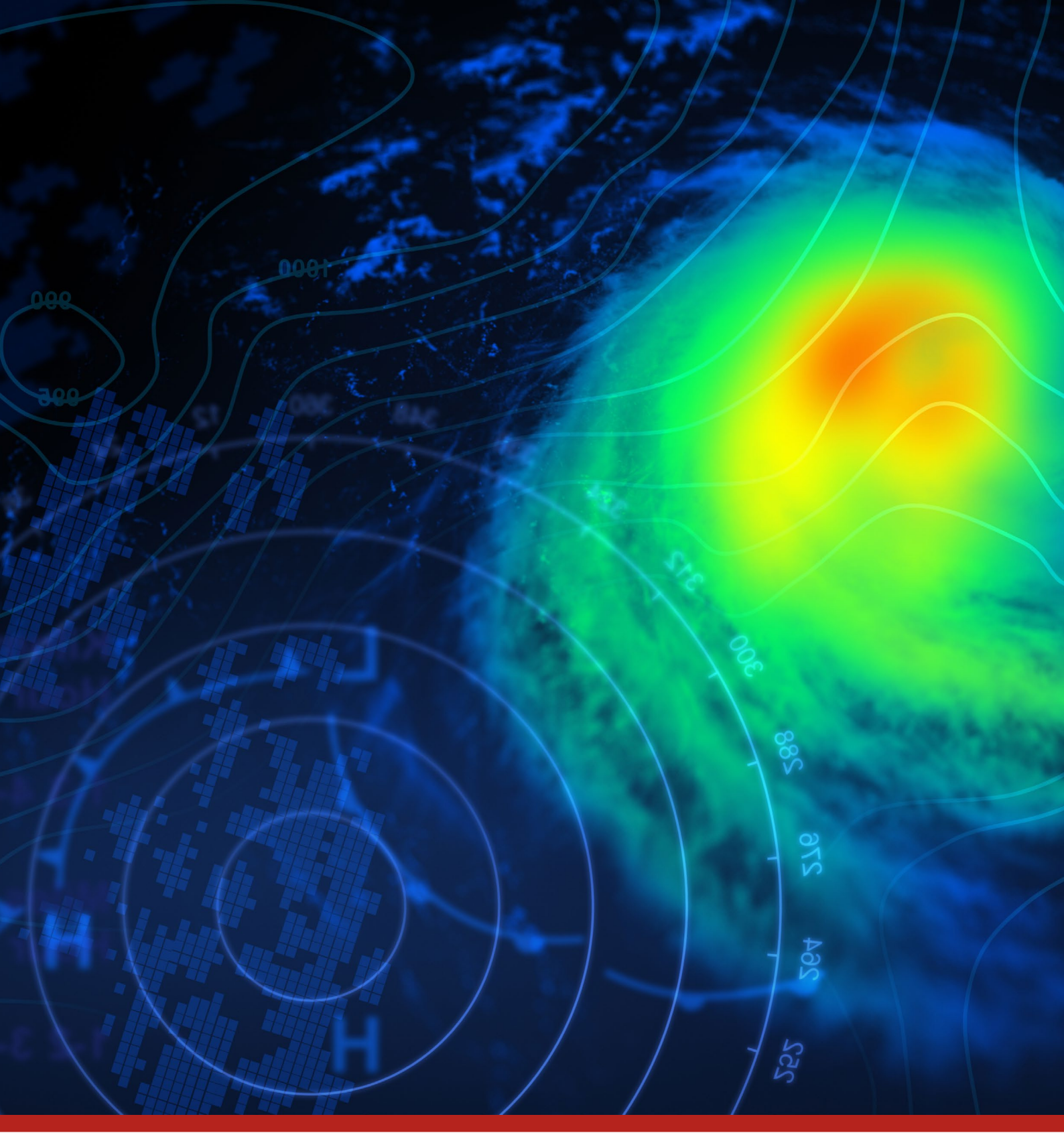

Rural R&D for Profit program
Final Report
Improved use of seasonal forecasting to increase farmer profitability

AgriFutures™ Improved Seasonal Forecasting

Appendix 14

APPENDIX 14

ADOPT summary report

By Jemma Pearl (BCG)

Addressing activity 5 output 5(b) – apply the CSIRO's ADOPT tool to use of seasonal climate forecasts using the results of the case studies under activity 4.

Executive Summary

The recommendation from the analysis is that these results provide a great discussion point, while also highlighting that each industry is different, which needs to be kept in mind as funding is allocated to communicating and extending seasonal climate forecasting information at different timings for different decision points.

With the use of the CSIRO Adoption and Diffusion Outcome Prediction Tool and NSW DPI case studies produced as part of the Rural R&D4 Profit 'Improved use of seasonal forecasting to increase farmer profitability', the level of adoption and time to adoption were estimated for the individual decisions.

Decisions from all of the case study industries ranged between 15 to 19 years to peak adoption, while level of adoption was a lot more variable from 65 per cent to 12 per cent.

This was due to the nature of each decision, e.g. the timing in the production cycle, industry nuances, etc. The northern beef decision point showed the highest adoption due to the environmental consequences of the decision.

Grains (northern, south-eastern and western) all showed similar adoption, 38% for northern and south-eastern, and 36 per cent for western grains. Adoption levels were due to the complexity of the decisions as there were many other factors influencing decision, for example starting soil moisture for northern and south-eastern grains.

Southern livestock indicated an adoption level of 28 per cent, this was due to the flexibility of the southern livestock system, thus being able to move animals and resources with great ease than other industries enables them to be nimble.

Sugar and rice decision points revolved around harvest decisions and therefore the lower result of 20 per cent and 12 per cent was due to the extensive list of constraints that need to be taken into consideration that this time. The cotton case study results at 14 per cent also indicate the large list of issues that influence decisions at this time.

Background

As per milestone 5 (b), each of the case studies produced by NSW DPI have been run through the CSIRO ADOPT tool. This could not have been undertaken without the assistance of Rick Llewllyn (CSIRO), Rebecca Darbyshire and Michael Cashen (NSW DPI), Meredith Gutherie (DPIRD), David Cobon and Christa Pudmenzky (USQ), Dale Grey and Graeme Anderson (Agriculture Victoria) and Peter Hayman (SARDI).

The Adoption and Diffusion Outcome Prediction Tool (ADOPT) 'evaluates and predicts the likely level of adoption and diffusion of specific agricultural technologies and practices, with a particular target population in mind.'

Challenges and Assumptions

Given the nature of the model there were some challenges that were faced in the process, which included identifying a starting level, not having a 'new' invention or product, the generalisations that had to be made, understanding the nature and what was required for each question, and applying the case studies.

ADOPT presumes that there is a good understanding of the starting level of adoption. For example, when it comes to a new invention the starting level is likely to be zero.

ADOPT was designed to run a 'new' invention or product, for which seasonal climate forecasting is not and as per the milestone we're not anticipating a release of anything new.

Assumption had to be made either where data lacks or is not existent, which may have had an effect on the outcomes.

Questions

Making sure we understood what the questions was looking for meant that we were able to answer appropriately. Thanks to Rick Llewellyn (CSIRO) who was able to provide this guidance.

Each case study is very different, and therefore getting assistance from industry personal helped ensure that the answers were relevant to each industry.

All of the questions in the CSIRO ADOPT tool can be found in appendix 1, which all represent an ADOPT variable (Kuehne et.al 2017).

Overall, four questions were identified that made the greats difference to the adoption and time scale, being;

Q.19 – To what extent would the use of the innovation have net environmental benefits of costs?

Q.16 – To what extent is the use of the innovation likely to affect the profitability of the farm business in the years that it is used?

Q.7 – How easily can the innovation (or significant components of it) be trialled on a limited basis before a decision is made to adopt it on a larger scale?

Q.8 – Does the complexity of the innovation allow the effects of its use to be easily evaluated when it is used?

Results

The overall results are presented in table 1.

Industry	Predicted peak level of adoption (%)	Predicted years to peak adoption (yrs)
Northern beef	65	18
Northern grains	38	18
South-eastern grains	38	17

Western grains	36	15
Southern beef	28	18
Southern sheep	28	18
Sugar	20	19
Cotton	14	18
Rice	12	16

Implications for increasing Farmer Profitability from using Seasonal Climate Forecasts –

Predicted peak level of adoption (%)

Adoptability as indicated in table 1 was vastly different depending on industry. This is greatly understandable given that each industry represents its own case study as per Activity 4 of the 'Improved use of seasonal forecasting to increase farmer profitability' project.

Northern Beef had the highest level of adoptability at 65 per cent. Given the boom and bust cycles over multiple seasons around pasture production, it is understandable that seasonal climate forecasting information could provide assistance to this industry.

Northern Beef was also the only industry to answer question 19 about environmental costs and benefits as moderate environmental advantage, compared to either no net environmental effects or small environmental advantage. Given the sensitivity of this question it resulted in an increased adoption rate predicted than the other industries.

The grains industry showed the second highest level of adoption, with the northern, south-eastern and western grains regions predicting 38 per cent, 38 per cent and 36 per cent respectively. The northern and southern grains industry case studies were both planting opportunity decisions, where stored soil moisture and rotation played a role. While the western case studies looked into forward selling. Given the nature of forward selling the aim is to reduce risk not increase profitability. This resulted in a slightly lower adoption percentage because question 16 about profitability was lower than for the northern and south-eastern case studies.

Southern livestock has a lower adoption level because of the system's ability to more effectively move animals on and off farm, supplementary feed and closer access to resources and markets. While in some cases there will be a benefit to the industry to use seasonal climate forecasting information, other external factors also play a role in the effectiveness of seasonal climate forecasting information.

The sugar, cotton and rice have the lowest adoptability out of each of the industries. Both the sugar and rice case studies revolved around harvest decisions, thus these results show that at harvest time there are substantially more considerations that need to be taken. At this time seasonal climate forecasting information will be low on the priority list, especially given the set-up of the sugar industry.

The cotton case study investigated the proportion of dry land cotton planted. The low adoption figure will be due to dry land cotton being an add onto the main system of irrigated cotton, while also soil moisture levels being a key consideration.

Predicted years to peak adoption

Predicted time to adoption for each of the industries is similar, but given a starting state was not identified each industry could be at different points along this timeline. This will be affected by the extent of existing and previous funding, communication and extension. For example, it could be reasonable to predict that an industry that has had a dedicate seasonal climate forecasting communication tool (e.g. the Break, Milking the Weather, WA Seasonal Climate Outlook, Moisture Manager, Sugar Seasonal Climate Newsletter and Weather or Not) would be further along the timeline than an industry that hasn't had a dedicated service.

Overall, these results give a guide to what the predicted level of adoption and time to near-peak adoption for each of the industry case studies produced in Activity 4 of the 'Improved use of seasonal forecasting to increase farmer profitability' project are.

These results provide a great discussion point, while also highlighting that each industry is different, which needs to be kept in mind as funding is allocated to communicating and extending seasonal climate forecasting information at different timings for different decision points.

Understanding which points for each industry the requirement for seasonal climate forecasting information can greatly improve efficiency and effectiveness of researching, developing and extending seasonal climate forecasting information.

References

Kuehne G, Llewellyn R, Pannell DJ, Wilkinson R, Dolling P, Ouzman J and Ewing M (2017) 'Predicting farmer uptake of new agricultural practices: A tool for research, extension and policy' *Agricultural Systems* vol. 156 pp.115-125