Project Catalyst Final Report

Using End of Row Sensors to Manage Tailwater

Grower Information	
Grower Name:	Paul Villis
Entity Name:	Jurgens Cane Farming
Trial Farm No/Name:	BKN-09022A
Mill Area:	Kalamia
Total Farm Area ha:	
No. Years Farming:	
Trial Subdistrict:	Burstalls
Area under Cane ha:	

Trial Status

- Completed

Background Information

Aim: To utilise radio base stations and radio, wireless technology **to alert grower to finished sets, reducing run off and water wastage.**

Background: (Rationale for why this might work)

Approximately 95% of sugarcane grown in the Burdekin is furrow irrigated. Irrigation run off is a function of furrow irrigation. At the moment, growers can't be sure when their sets have finished, therefore, significant water losses may occur. There is no alert system currently available to growers that will alert them to when water has reached the bottom of the paddock.

- **If we assume that 20% of applied irrigation water is lost to run off:**
- **The grower applied 0.6ML/ha during an irrigation**
- **If 20% is lost, that is 0.12ML/ha OR 120 000L/ha of run off per irrigation**
- **If we assume this is over a 12 hour set, what happens if we shorten the irrigation to 10 hours? How can we achieve this?**

- **If our previous 12hr irrigation was applying 0.6ML/ha, this equates to approximately 50 000L/ha per hour**
- **If the sensor alerted the grower at 10 hours instead of 12, he/she could shorten the irrigation by 2 hours. This would save 100 000L/ha from being applied.**
- **This would also save around 20 000L/ha from leaving the paddock as runoff (assuming 20% loss).**

Potential Water Quality Benefit:

Irrigation run off is the primary pathway for nutrient, pesticide and sediment losses from the paddock. By reducing the volume of water leaving the paddock, it is hoped that the level of nutrient, pesticide and sediment that leaves the paddock is also reduced.

Expected Outcome of Trial:

By supplying the grower with a wireless end of row sensor, it is hoped that being alerted to when their sets have finished will lead to sets being changed or pumps being turned off in a more timely manner.

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Where did this idea come from:

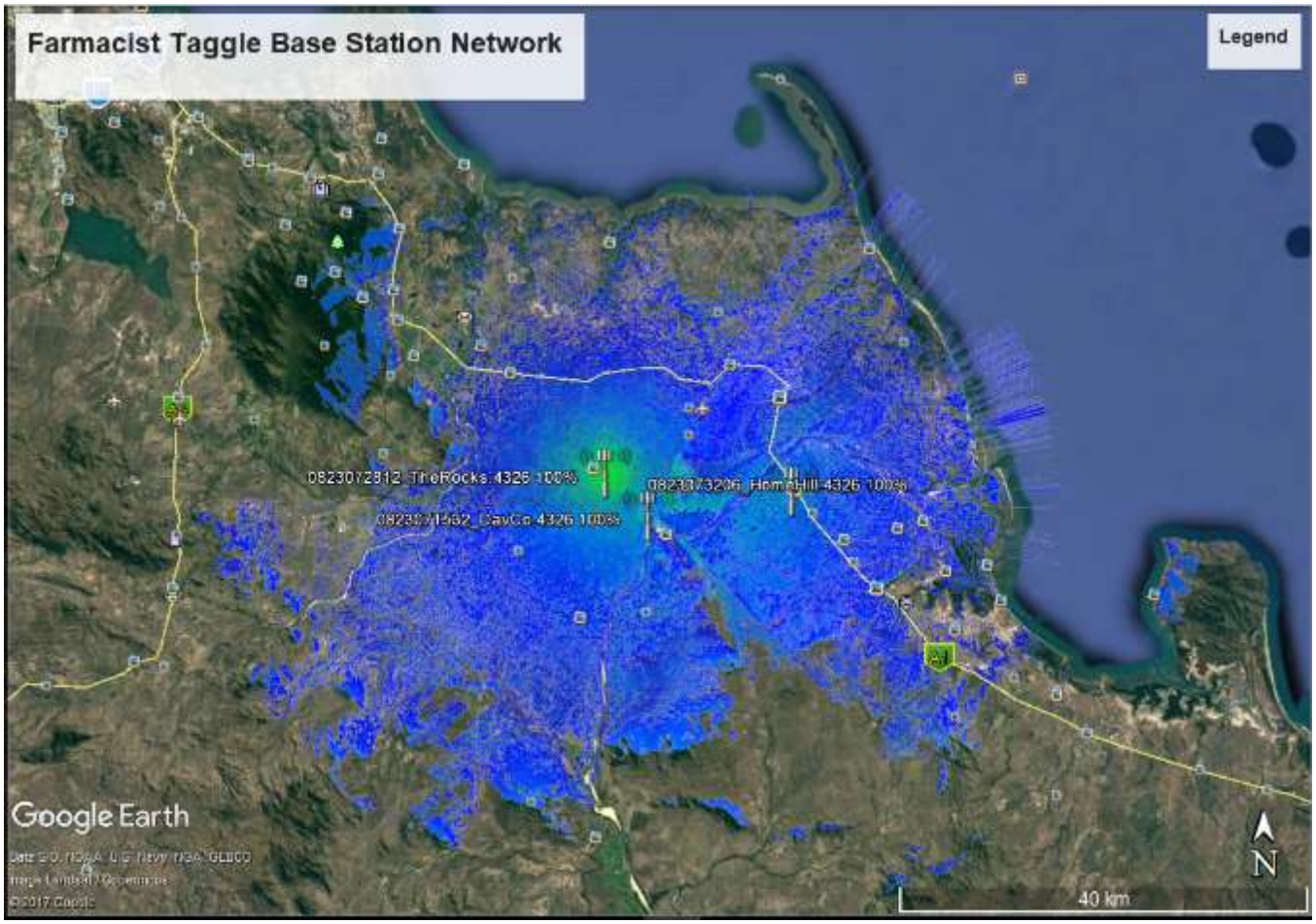
Plan - Project Activities	**Date : (mth/year to be undertaken)**	**Activities :(breakdown of each activity for each stage)**
Stage 1	**Jan-July 2017**	Design an end of row sensor that will communicate with a low power radio base station network
Stage 2	**July – Dec 2017**	Implement the base station network
Stage 3	**Jan -Dec 2018**	Test the sensor for reliability and robustness.
Stage 4		
Stage 5		
Stage 6		

Project Trial site details

Trial Crop:	Sugarcane
Variety: **Rat/Plt:**	Various
Trial Block No/Name:	Various
Trial Block Size Ha:	Various
Trial Block Position (GPS):	Various
Soil Type:	Various

Block History, Trial Design:

Once the base station network was set up, the coverage is expected to be similar to the image below:



The sensor being used is pictured below:

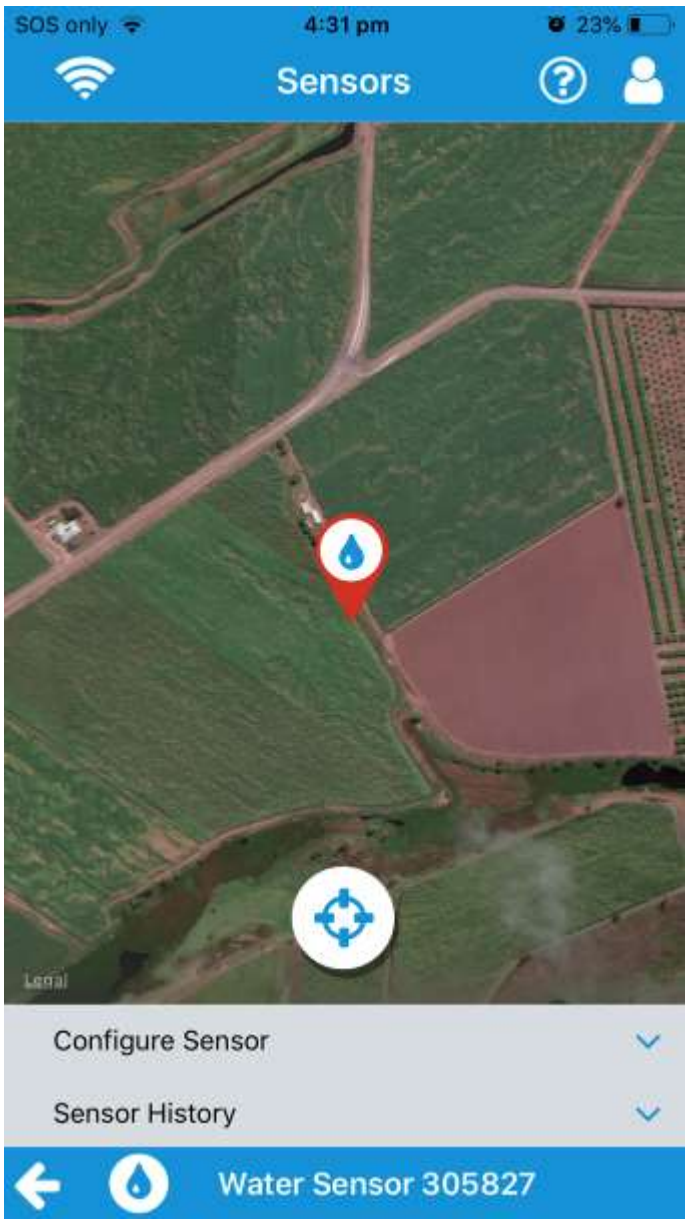
It is a simple open/close circuit – a complete circuit (in water) reads as “wet” and an incomplete circuit reads as “dry.” The notificatiosn are sent to the Farmacist smart phone app (available for iPhone and Andriod):

Treatments:

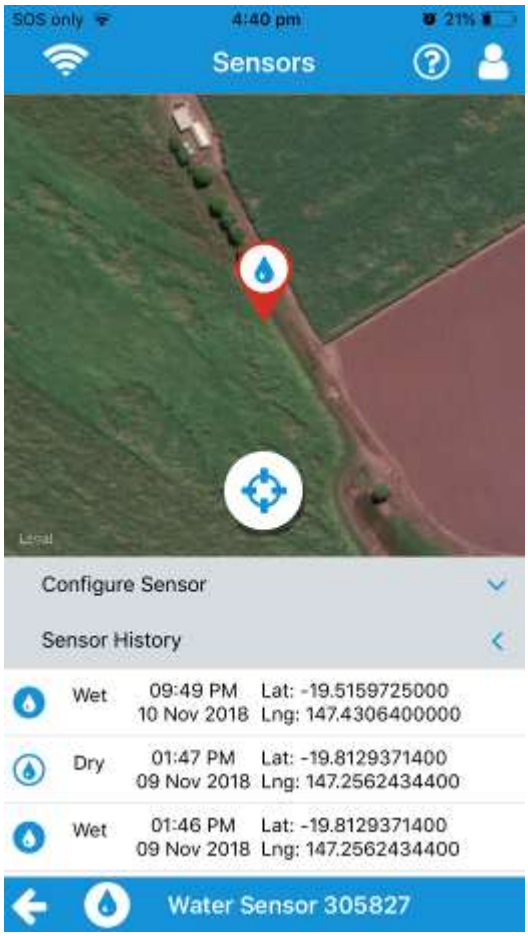
Results:

The grower was trialling the sensor to alert him to when his sets were finished with some success. His farms are located in a poor signal area for the Taggle basestation network; however, he has had some success with the sensor reporting back correctly.

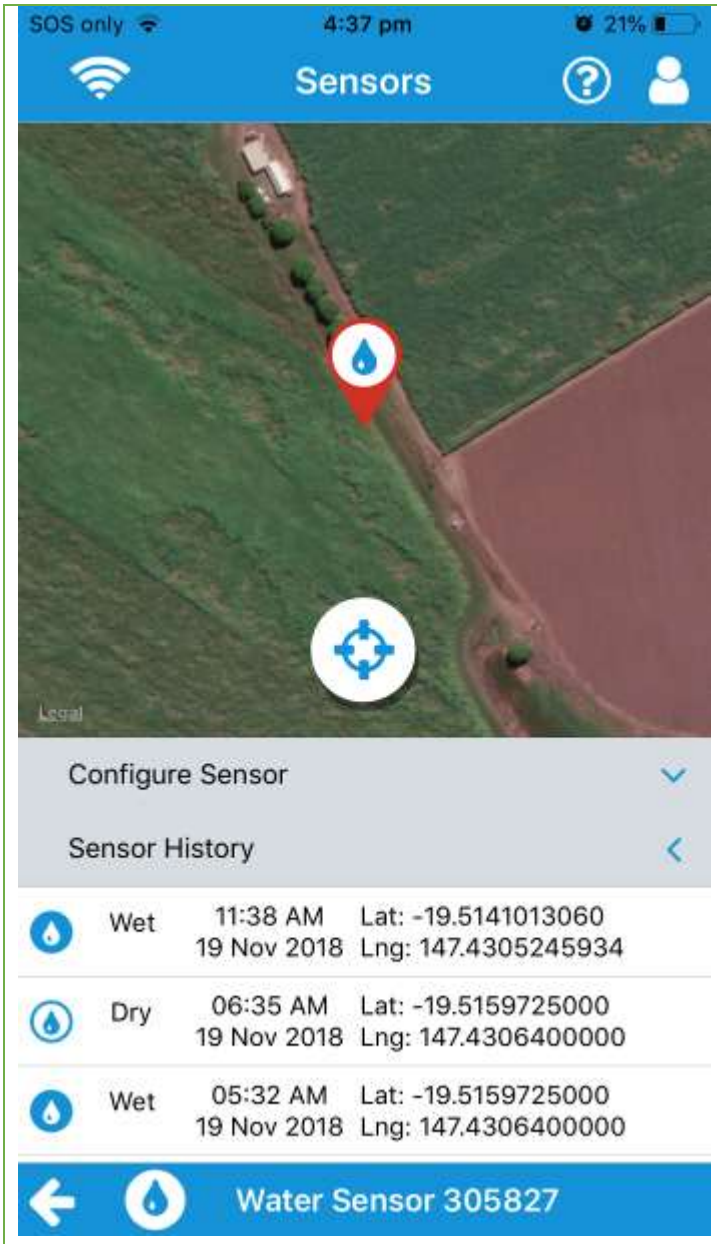
The grower installed the sensor in one block in order to test it; however, the cane has lodged where the sensor was positioned and the grower has not been able to go find the sensor yet. The image below is of the sensors last known location.



The image below is of some of the reading from the sensor on the 8th and 10th of November 2018. The sensor was reading dry at 1:47pm, and then wet at 9:49pm. This tells the grower that the set ended and he can now turn off the water.



That being said, there were some readings that came through that didn't make a great deal of sense and this reduced the growers confidence in the sensor. The example below is an indication of these incorrect readings. In this case, the sensor state change from wet to dry to wet 3 times between 5:30am and 11:30am. These changes of state may have been due to the float switch moving with waves in the water (instead of reacting to a change in water height).


SOS only
4:37 pm
21%
Sensors
Legal
Configure Sensor
Sensor History
Wet 11:38 AM 19 Nov 2018 Lat: -19.5141013060 Lng: 147.4305245934
Dry 06:35 AM 19 Nov 2018 Lat: -19.5159725000 Lng: 147.4306400000
Wet 05:32 AM 19 Nov 2018 Lat: -19.5159725000 Lng: 147.4306400000
Water Sensor 305827

Conclusions and comments

If the sensors can be developed to be more robust and reliable, and the base station network can be improved to deliver more consistent signal to greater areas of the Burdekin, this technology could be very useful to Burdekin growers. However, with the current technology and radio signal, the sensors are not reliable enough for growers to trust them to send accurate notifications. Until then, they are unlikely to gain traction as a irrigation management tool.

Advantages of this Practice Change:
These sensors could help growers by alterting them to when their sets have finished so they can change the set or turn them off. This helps them to save water and power and reduces the risk of inputs (fertiliser and pesticides) leaving the paddock. The sensor is also a low cost option, which would help with uptake.

Disadvantages of this Practice Change:
At the moment, the technology and radio signal is not robust or reliable enough for growers to trust the sensors to alert them to when their sets are finished. If growers rely on the sensors at the moment, and the sensor does not send them a notification when the water has reached the end, this could result in excessive water being applied – a waste of water, power, inputs and risks flooding paddocks and/or neighbours.

Will you be using this practice in the future:
If the technology becomes more accurate, this would be a useful tool to growers in managing their irrigations. Until then, probably not.

% of farm you would be confident to use this practice :
With the technology in it's current state, the grower is not confident in this practice.