

Irrigation Check Up Programme 2018/19

Maintaining a high level of irrigation efficiency is one of the key building blocks to achieving Good Farming Practice and effective region wide water management. Understanding how well a given system is working is the first step in working towards efficient water use. It can also contribute towards optimising crop quality and quantity and influence nutrient management.

The Irrigation Check-Up programme was established for the 2017/18 summer to be a hands on practical way of promoting efficient irrigation. Due to the success of the initial programme it was run for a subsequent season. The programme was not a data collection exercise, it was about raising awareness and positive behaviour change. The data must be considered in this context. In many cases assessing poorer systems was considered a priority rather than those that were likely to get a better result, so the data will be skewed towards this.

The programme followed a similar format to that of the previous year. Summer students worked with participants to check their irrigation systems and provide them with useful feedback and results. A survey was also used to find out about on farm water management practices and scheduling. In total 30 participants had systems assessed, which equated to 57 irrigation systems. In addition to this, some systems were retested under different test conditions and one was only partially tested at the request of the participant. This covered a range of land use and irrigation system types. Irrigation NZ were key consultants for this programme.

Throughout the programme, the region experienced poor weather conditions with weeks of rain and wind above testable levels. Even when weather conditions were ideal, the ground was often water logged preventing access or risked further damage to crops and soil. For those with portable irrigation systems, many did not set up their irrigation guns till very late in the season, if at all, so were not available to be checked. Unfortunately the poor weather conditions meant that a number of systems scheduled in, could not be checked.

In most cases participants were actively approached. There was a focus on working with Tukituki surface take consent holders due to the lower minimum flows that came into effect in 2018. This was to assist in the transition to these new minimum flows. To get the greatest coverage many 'corporate' growers were also approached, although the programme was available to any irrigation consent holder. Most of those contacted were very supportive of improving irrigation efficiency. The programme also provided a platform and opportunity to actively engage with landowners, predominantly in the Tukituki catchment

Due to the focus in the Tukituki catchment where there is mainly pasture and arable production, the proportion of Pivot/Hard hose systems were significantly greater at 73% than that of Drip/Micro systems (26%).

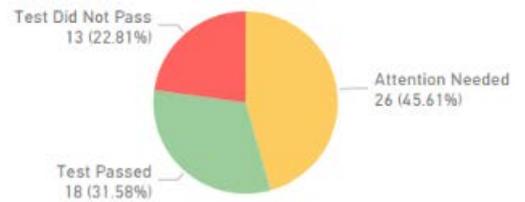
Test results

The programme involved a basic irrigation check on as many irrigation systems as was practical for each participant. A 'bucket test' assessed Distribution Uniformity (DU) or Emitter Uniformity (EU) which checks how evenly the water is being applied and also compared target application depth to an actual application depth. This data was processed through the Irrigation NZ 'Check-it Bucket Test App' for pivot and hard hose systems, or the Irrig8lite software for dripline and micro sprinkler irrigation systems. General irrigation observations were also recorded.

Uniformity (≥ 0.8 is generally accepted as the performance benchmark for uniformity)

- The uniformity results ranged from very poor at 0.33 to excellent at 0.95 (coincidentally the same as 2017/18)
- 31.5% of all systems performed well with an irrigation uniformity of 0.8 or above and required little or no corrective actions, 45.61% of systems required some attention to improve the performance. Those that 'Did Not Pass' required more significant work (22.8%).
- The percentage split was similar for both Drip/ Micro and Pivot/Hard Hose system types.

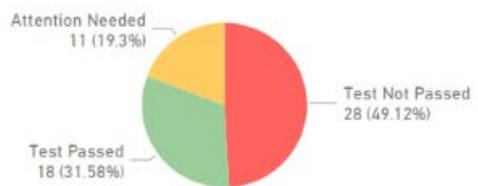
Uniformity Results For All Systems



Target depth (within 10% of target depth is considered a suitable result)

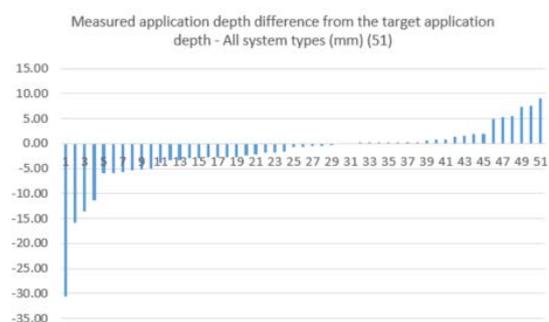
- A relatively low percentage of systems passed the application depth assessment (31%), with 49% achieving a test not passed.
- For those with Pivot / Hard hose systems with a test not passed result, often this can be a speed calibration issue and it was advised they sought further advice.
- Similar to last year, a number of the drip/micro systems did not have a known target depth so could not be included in the data set.
- In some circumstances it is possible to simply adjust irrigation management accordingly to the actual application depth, provided an adequate Uniformity result was achieved.
- This assessment does not take into account that an irrigator using soil moisture monitoring could still be applying the correct total amount of water regardless of failing this benchmark. Instead of applying a predefined depth they are using real-world monitoring as a trigger to start or cease an irrigation event.

Difference Between Application Depth Measured and Target For All System Types



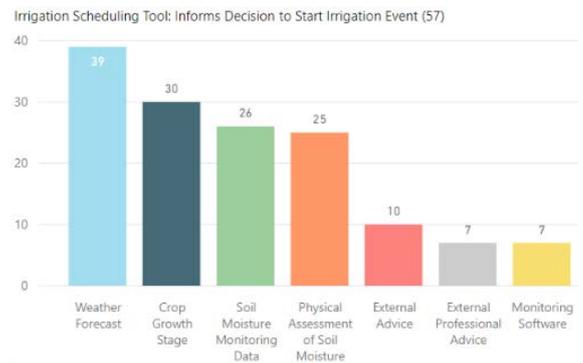
Target depth and overall water use

- Target application depth in comparison to that actually applied has been assessed to indicate if overall water use is greater or less than target. Per unit time 60% of systems assessed apply less water than targeted, and 27% applied more (note 51 data points). Note the degree of application variation ranges from minimal to significant.
- The majority of irrigation systems assessed applied less water per unit time than was targeted. This does not automatically mean that less water in total is being used than is required as it does not take into account the decision making process to cease irrigation events.
- For those with soil moisture monitoring, they are likely to continue to irrigate until soil moisture levels have returned to the desired level. Alternatively irrigators may know that a set duration of irrigation is enough to increase soil moisture to what is required.



Soil moisture monitoring

- There was good uptake for soil moisture monitoring technology by participants. Out of the 57 surveys, 26 (45.6%) used soil moisture monitoring. Of those, 23 use this data for decision making every time they irrigate, with the remainder using it most times.
- Out of the 57 surveys, 14 (24.5%) use Monitoring Software and/or External Professional Advice, with 11 of these using this advice every time they irrigate (note some may use these methods in conjunction with soil moisture monitoring).



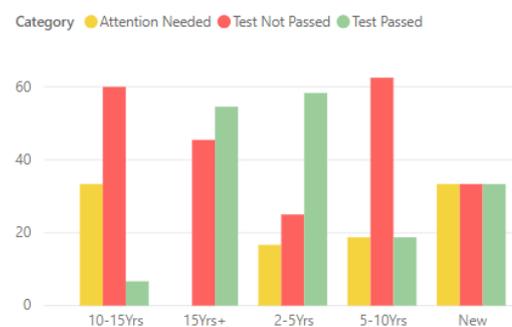
Age of infrastructure

- The 2017/18 programme results showed that the age of infrastructure can be linked to both of the benchmarks assessed: uniformity and application target depth. The same pattern is evident in the 2018/19 uniformity results but not the application depth results.
- As systems approached the 10 year mark, there was a drop-off in uniformity indicating the need for better maintenance. For systems 15 years or older, maintenance requirement increased further and some could be reaching the end of their serviceable life.
- From a regional water management perspective, future programmes could focus on the older irrigation systems to get the greatest potential gains.
- There was no obvious pattern for application depth. Some of the new systems were still undergoing commissioning so it is anticipated that the irrigation industry would be able to rectify application depth issues before long term operation. A recheck post commissioning would be recommended.

Age of Irrigation System vs Distribution Uniformity (As a Percentage)



Age of Irrigation System vs Application Depth Results (As a Percentage)



Observations

The students recorded observations for the blocks they assessed and reported these back to participants. This assessment is subjective and did not seek to identify all potential issues. Observations were split into those that were 'significant' and 'minor' categories.

The most frequent 'minor' observation was the presence of leaks with most irrigation systems having some form of leaks. Other observations in this lower category included detached or non-functional fittings e.g. sprinklers and end caps.

For those with more significant observations, the extent of the leaks or issues were greater by either number or size of leaks. In this category some systems had ponding issues. Due to significant rainfall

events this is most likely attributable to fuller soil profiles rather than application intensity exceeding infiltration rate.

More difficult issues to identify such as reduced well or pump performance, design or installation issues, debris build up in pipes etc were beyond the students skill set so were not commented on.

General programme outcomes

Most of the consent holders approached were very supportive of improving irrigation efficiency and having their systems checked. A letter with results was submitted to each participant which included the efficiency results and observations for the area the students were testing.

Tukituki surface take consent holders were largely supportive of the initiative and took advantage of the opportunity. More would have participated had the weather been suitable.

Again, confidentiality of individual system results is very important to give participants confidence to sign up. This needs to be maintained for a continued, trusted relationship.

The most important aspect of the programme was whether the participants found the programme beneficial. After the programme had concluded, Irrigation NZ phoned as many participants as possible seeking feedback. Of the 30 participants, 14 were able to be contacted, of these 13 reflected positively on the programme. More importantly, 9 of the 14 have either taken some sort of action or have indicated works to be done over the winter as a result of the programme. Note some participants represent multiple properties.

Recommendations

Overall the Irrigation Check-Up programme has worked with approximately 60 farmers throughout Hawkes Bay and checked many more irrigation systems from 2017-19. The intent of the programme was to build awareness of the importance of checking irrigation systems to enable irrigators to improve system performance (i.e. you can't fix something if you don't know it's broken). It was important to initiate this line of thinking, before it becomes a requirement through policy or industry Good Farming Practice. Feedback sought has shown that participants have largely found the process beneficial, with many seeking to improve their irrigation systems.

Farm Environmental Management Plans will in future require consent holders to have more justification around irrigation events and maintaining system performance to an acceptable standard. The capacity to perform these checks on the number of irrigation systems required far exceeds Council's capacity.

We believe that the Irrigation Check-Up programme has served its purpose in raising awareness. It is recommended that HBRC cease the Irrigation Check-Up programme with the focus redirected in building industry capacity to assess irrigation systems on a larger scale.

Currently there are very few industry professionals qualified to undertake irrigation system evaluations in Hawke's Bay. The focus would be on building up industry's awareness of the skills shortage and the change in expectations around irrigation system performance due to policy. HBRC staff can facilitate training attendance but the training would need to be run by Irrigation NZ. This would build up a pool of suitably qualified professionals. HBRC also needs to establish systems so that the data collected is practical, coordinated and useful.

Because there are behavioural aspects around irrigation, it is difficult to quantify whether improvements in system performance translates to a reduction in overall water use. Therefore it is also recommended that a focused project is established to evaluate the irrigation efficiency in a localised area that already has good historical water use data.

All participants are commended for participating and voluntarily taking steps towards efficient water use. HBRC now needs to partner with industry to continue improving how we manage and use Hawke's Bay's water resource for both environmental and economic gain.