

HAWKE'S BAY REGIONAL COUNCIL
ENVIRONMENT AND SERVICES COMMITTEE

Wednesday 05 September 2018

Subject: IRRIGATION CHECK-UP PROGRAMME 2017

Reason for Report

1. To provide the findings of the Irrigation Check-up programme carried out in 2017.

Background

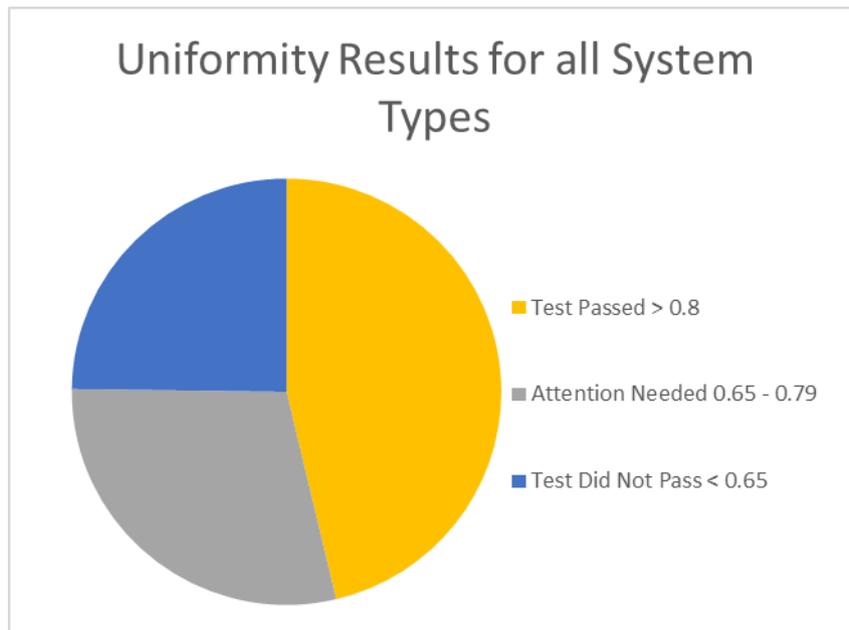
2. Maintaining a high level of irrigation efficiency is one of the key building blocks to achieving Good Farming Practice and effective region wide water management. It can also contribute towards optimising crop quality and quantity.
3. The Irrigation Check-Up programme was established to be a hands on practical way of promoting efficient irrigation. The voluntary programme ran over the 2017-18 summer and is currently under consideration for following seasons. Irrigation NZ were key consultants for this programme.
4. 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 41 properties were assessed, which equated to 51 irrigation systems. This covered a range of land use and irrigation system types. Results can only be considered indicative as the sample was not randomly chosen.

Test Results

5. The programme involved a basic irrigation check on up to two irrigation systems for each participant/ manager. 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.
6. Although most participants were put at ease and were confident to answer accurately, there was concern from the students that some responses were the 'right' answer, rather than reflecting reality. By participating in the programme however, all participants have shown they are aware of the importance of efficient irrigation. Understanding how well a given system is working is the first step in working towards efficient water use.

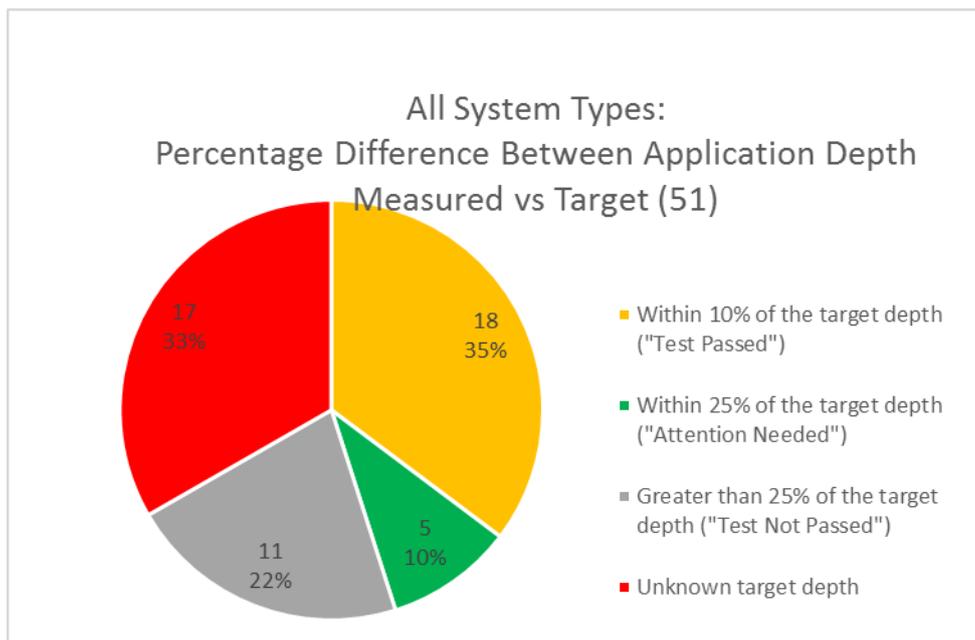
Uniformity (≥0.8 is accepted as the performance benchmark for uniformity)

7. The uniformity results ranged from very poor at 0.33 to excellent at 0.95.
8. 49% of all systems performed well with an irrigation uniformity of 0.8 or above and required little or no corrective actions, 24% of systems required some attention to improve the performance. Those that 'Did Not Pass' required more significant work.
9. Drip/ Micro systems performed reasonably well with 59% of them achieving an EU of 0.8 or higher. The pass rate for Pivot and Hard hose systems was much lower at 37%.



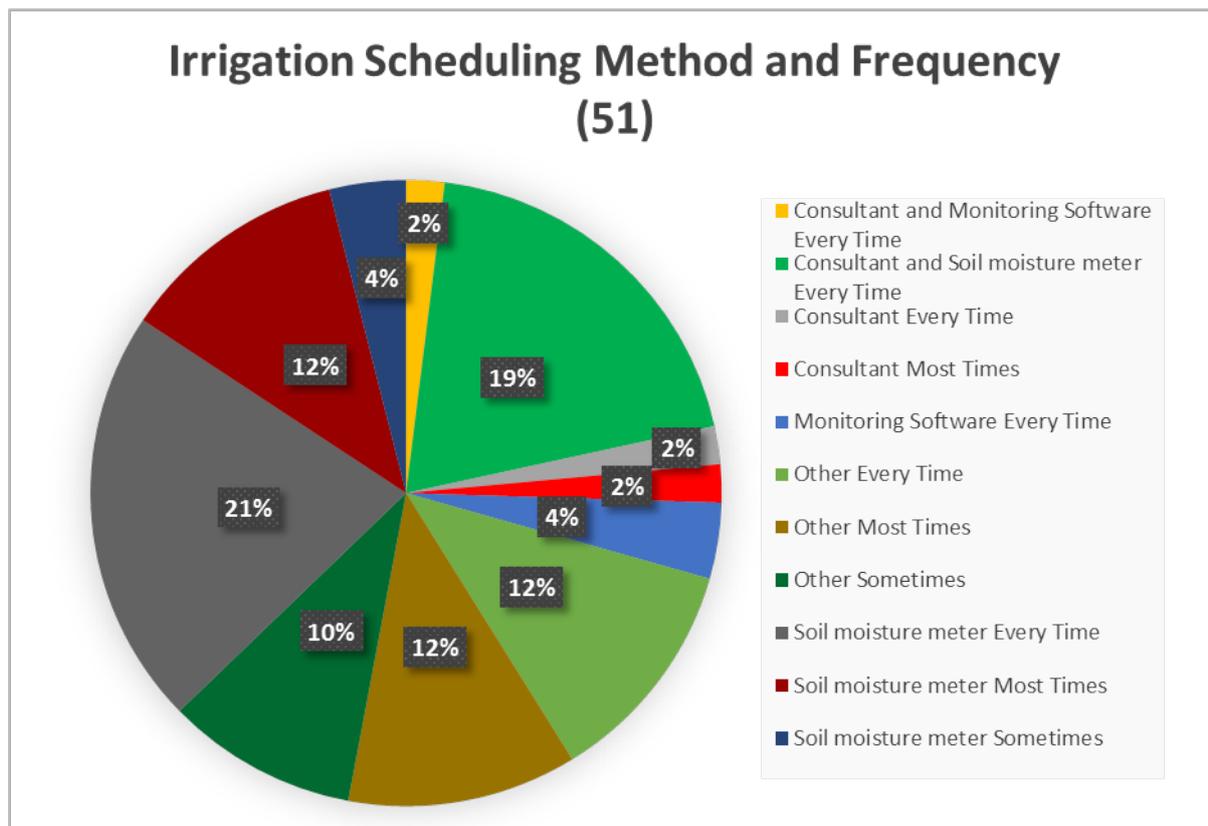
Target depth (within 10% of target depth is considered a suitable result)

10. A relatively low percentage of systems passed the application depth assessment (35%). A similar percentage did not know their target depth.
11. Those that did not know their target depth were all Drip/Micro. Initially this was concerning, however the data revealed that for most of this group alternative methods were used to schedule irrigation. Most used one or a combination of soil moisture metering, monitoring software and/or consultant advice to schedule irrigation. Some also consider irrigation in terms of litres per hour or litres per plant.
12. However, it is still important, for all irrigation system types, to be aware of actual application depth (mm) so consultancy advice can be acted on more effectively, allow for easier comparison with weather forecast information, and minimise environmental impact (drainage).
13. For some, the programme helped to inform participants of their system application depth.



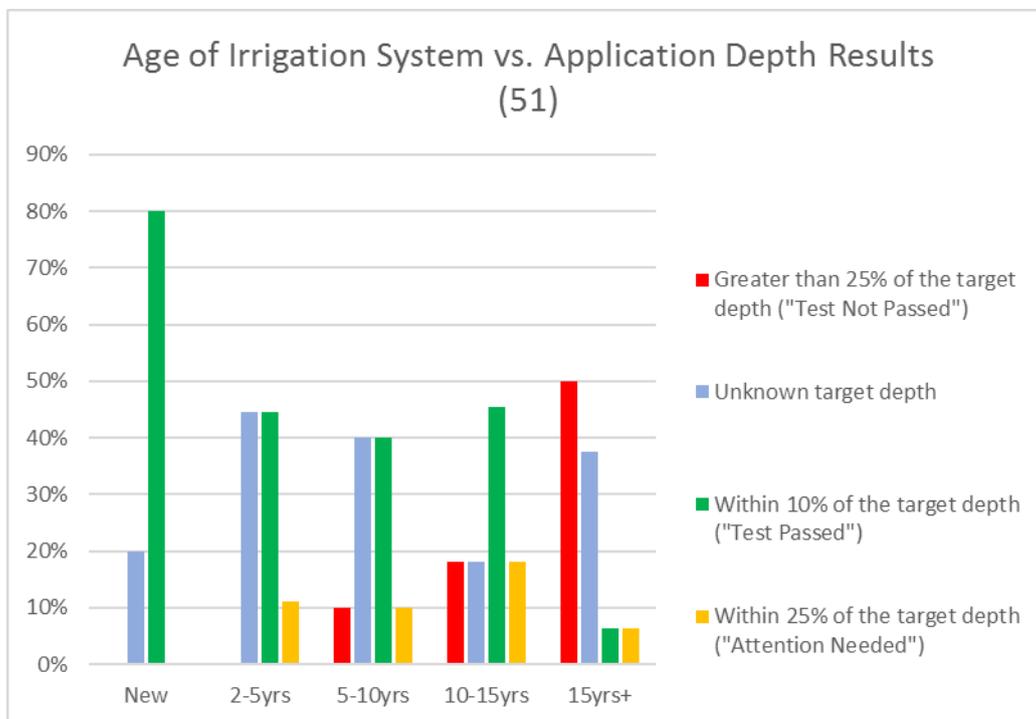
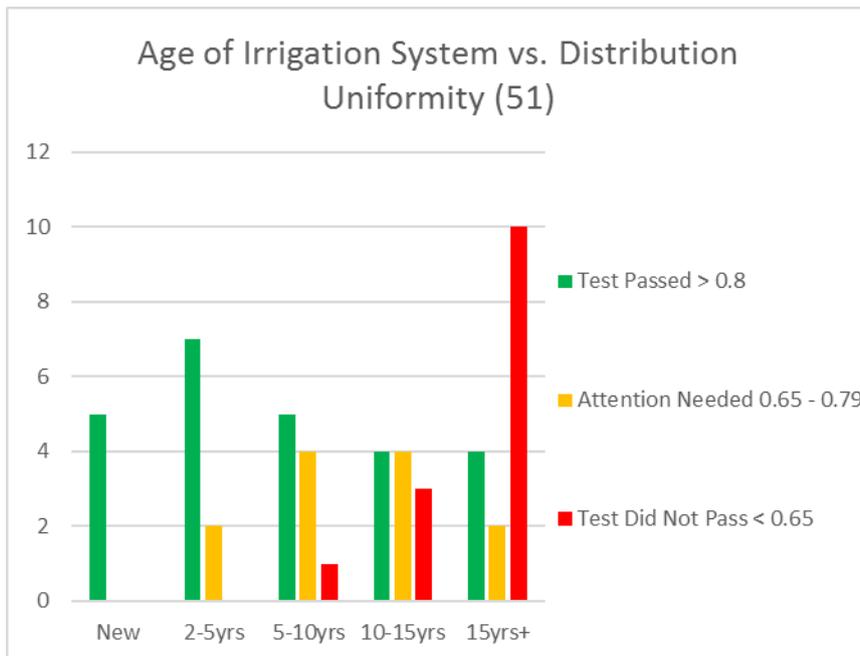
Soil moisture monitoring

14. There was good uptake for soil moisture monitoring technology by participants. A combination of soil moisture meters, monitoring software and or a consultant to assist with irrigation scheduling was adopted by 67% of the participants.
15. How this information is used is the most important aspect. Of the group using some form of soil moisture monitoring, 73% used it 'every time' and only 6% used it 'sometimes'.
16. Nearly all of those using consultancy services to schedule irrigation were Orchardists. Correspondingly the uptake for these services were low for all of the other land uses.
17. Those using 'other' methods to schedule irrigation were in most cases using methods such as 'digging a hole'.



Age of infrastructure

18. The programme results showed that the age of infrastructure can be linked to both of the benchmarks assessed: uniformity and application target depth.
19. Reassuringly new systems were all performing as they should, with a 100% pass rate for uniformity and 80% for application depth (noting an 'unknown' response).
20. As systems approached the 10 year mark, there was a drop-off in performance 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.
21. From a regional water management perspective, future programmes could focus on the older irrigation systems to get the greatest potential gains.



Observations

22. 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.
23. Overall, some of the issues observed appeared to be similar, irrespective of a high or low uniformity test results, however, the extent of the issues appeared to be more significant in the poorer performing systems e.g. leaks became bigger/ increased in number for drip micro, or the presence of leaks in pivots became noticeable in the poorer systems.
24. The same issue observed could be caused by a number of different factors and could be a symptom of an underlying problem, e.g. water quality, pressure, well performance, pump performance etc. Basic field observations are recorded following.

Performance Level	Drip / Micro	Pivot / Hard hose
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Main issues observed for systems with 0.8 and above DU results	<ul style="list-style-type: none"> • Mostly minor leaks, some tending to significant • Some sprinkler heads detached/missing • One to a few had disconnected lines, end plugs missing or lateral ends not closed off properly • Some end of row drippers not working • A range of sprinkler types • Slight algal growth • Variable dripper outputs • Some sprinklers not spinning 	<ul style="list-style-type: none"> • Individual to a few sprinklers not spinning or spinning slowly • Individual to a few sprinklers dribbling • Individual to a few sprinklers partially blocked • Variable spray patterns • Minor chance of wind drift issues
Main issues observed (in addition to those above) for Drip/micro with below 0.8 DU results	<ul style="list-style-type: none"> • Significant leaks more prevalent • Many drippers not working throughout blocks • Many drippers emitting obviously (visually) more flow than others • Water quality issues causing blockages e.g. iron flakes, algae • Disconnected lines, end plugs missing or lateral ends not closed off properly • A significant range of sprinkler/dripper types within a block 	<ul style="list-style-type: none"> • Many sprinklers not working • Many worn sprinklers • Sizable leaks between spans • Faulty end guns • Nozzles missing • Wind drift • Some ponding • A lack of run overlap

General programme outcomes

25. From a general uptake and motivation perspective, some participants were initially cautious of the programme. They were possibly concerned about the outcomes if they had poor results. Others who already suspected their irrigation system was not up to scratch, were keen to get their systems checked and find out how big the issue was. In some cases their system results helped the participant to prioritise repairs or push for system upgrades. For those with newer system this simply gave them reassurance that they were on the right track or highlighted if improvements were possible.
26. The most important aspect of the programme was whether the participants found the programme beneficial. The post programme survey revealed that there was a high level of satisfaction for those that responded. All respondents indicated both that they found their results data useful, and that they would participate in any future programme (12 respondents).
27. It was noted that all of the post programme respondents that had 'room for improvement' results were either 'working towards improving their irrigation system', or 'working towards replacing their irrigation system' (7/12 respondents). The remainder had irrigation systems that were operating efficiently so no immediate action was required.

Future of the Irrigation Check-up programme

28. To get the most gains, the programme results highlighted some specific areas that future work needs to focus on:
 - 28.1. Robust irrigation decision making (pivot and hard hose systems)
 - 28.2. Irrigation system management e.g. minimising wind effect (hard hose systems)
 - 28.3. Knowing irrigation application depths (drip/micro systems)

- 28.4. The increasing rate of inefficiency as irrigation systems age and the lost productivity return associated with older inefficient systems
29. Increasing awareness of efficient water use and changing approach to irrigation (if required) were the key objectives of the programme. There is a change in Hawke's Bay about how water is being managed e.g. the TANK Plan Change. It will take time for this understanding to result in behaviour change, but it is happening. Support and tools need to be in place to assist the necessary behavioural shift. The Irrigation Efficiency programme can assist with this.
 30. In the establishment phase of this programme, data security was a concern by some industry groups. Protection mechanisms were put in place to prevent individuals' data from being used out of context or for compliance purposes in the form of a participant agreement. The programme was established to promote irrigation efficiency without fear of repercussion. All participants are commended for participating and voluntarily taking steps towards efficient water use.
 31. Council is currently considering whether to run this programme again. In order to do this, it is critical that 'good will' is maintained. The overall goal is for all irrigation water users to use water responsibly and effectively. This programme shows that it can be done effectively, in a positive way.
 32. Staff recommend that HBRC continues the Irrigation Check Up programme (or similar) to assist irrigation consent holders with improving water use efficiency as part of Good Farming Practice; as a service to consent holders, with no additional cost.
 33. Overall the message and understanding of water efficiency was well received, and further work with consent holders would be beneficial for maximising the region's water resources.

Decision Making Process

34. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision making provisions do not apply.

Recommendation

That the Environment and Services Committee receives and notes the ***"Irrigation Check-up Programme 2017"*** staff report.

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Attachment/s

There are no attachments for this report.