

The value of on farm water quality monitoring



The Mackay Whitsunday region boasts a strong history of water quality monitoring and proactive engagement focusing on the paddock and local creek scales. Farmers in this region continue to make significant strides in improving farm management practices to reduce off farm runoff.

The LAND HUB project improves on farm decision-making through increased data access and utility, with three monitoring sites showcasing its benefits for growers. The project is part of the Mackay Whitsunday Water Quality Program, funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation. This fact sheet explains the process of on farm water quality data collection and the benefits for growers.

Why do we monitor water quality? ▼

Monitoring water quality paddock runoff provides valuable data to understand fertiliser, pesticide and sediment surface losses, allowing for more effective planning and retaining products on the paddock. It also serves as a benchmark for comparing different management practices and enhances our understanding of product losses from farms.

Water quality monitoring has been instrumental in refining key management principles like timing, placement, product selection, and application rates. For instance, it helps predict potential paddock losses based on different product usage scenarios.



Catchment Solutions flume and sampler set up

What is involved in monitoring? ▼

A good water quality monitoring program involves two main aspects: measuring the quantity of water flowing off a field and analysing water samples in a laboratory for substances like nutrients, pesticides, and soil particles.

Since the concentration of nutrients and pesticides may vary greatly from the beginning to the end of the runoff period, it is important that the monitoring best captures this variability. This can be done through either the collection of multiple samples or via a 'flow-weighted' sampling approach.

Scientists can determine how much nutrients or pesticides are in runoff water by multiplying the concentration by the volume of water to calculate a load. Then, we can convert this into a measure that tells us how much of the products we applied to the field were lost. We can also compare the amount of runoff water to the amount of rain that caused it.

KEY MESSAGES

1

Water quality monitoring helps quantify the loss of fertilisers and pesticides in runoff from specific paddocks.

2

There can be limitations to data and this is reflected in the results communicated.

3

Combined with agronomic data, these results guide improved land management decisions.

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What types of results can I expect and what are the limitations? ▼

Water quality data can help us measure how much fertiliser and pesticides are lost when water runs off a field. Measuring runoff from multiple treatments, or replicating sites provides more robust monitoring and data, allowing us to compare different farming practices more accurately.

However, there can be uncertainties in these measurements, similar to uncertainties in any field or lab work. Scientists often include an "error bar" to show this uncertainty. Equipment problems, how water flows on the field, and difficulties in collecting samples can complicate the processing and interpretation of water quality results.

So, we must be cautious when interpreting field results, but the findings become stronger when we replicate the same field trial or conduct multiple trials over time with similar results.

MORE INFORMATION

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What can farm monitoring data be used for? ▼

On farm water quality measurements play a crucial role in quantifying the environmental benefits by reducing off farm losses of fertilisers and pesticides. These measurements also boost farmers' confidence in adopting improved practices, knowing they are contributing to reduced runoff losses off farm.

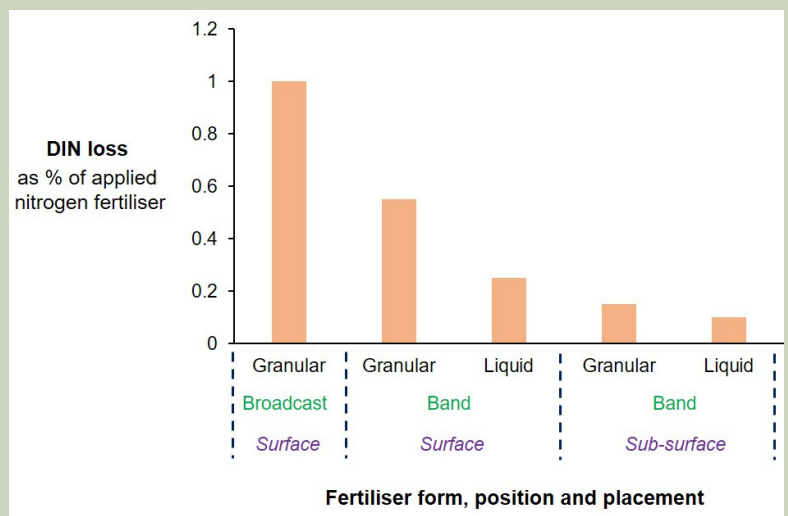
Research shows improving water quality often leads to productive co-benefits, and having reliable data on the effectiveness of these practices empowers farmers to make informed decisions that benefit both the environment and their financial performance. The graph below provides an example of water quality monitoring that has quantified the benefits of various fertiliser formulations, applications, and placement.

DID YOU KNOW?

Inshore seagrass meadows and coral reefs are some of the greatest ecosystems at risk from low water quality in the Mackay Whitsunday area. Round Top and Flat Top Islands, located less than 10 kms off Mackay's shoreline, are particularly vulnerable to herbicide exposure and increased nutrients. The inner passage of the Whitsunday Island Group face water clarity and increased nutrient issues. Collectively reducing runoff from farms will directly improve the resilience and health of these ecosystems.

Results from paddock water quality monitoring

This graph summarises results of a recent water quality trial, which measured paddock surface runoff losses of dissolved inorganic nitrogen (DIN) across different fertiliser formulations, types of application, and surface and subsurface placements. The data show reduced surface runoff losses from both subsurface and liquid fertiliser applications (modified from Armour et al. 2022).



Footnote: Armour J (Ed.), et al. 2022. Effect of agricultural management practices on water quality. Paddock monitoring for the Paddock to Reef program, 2009–2020: [A synopsis](#). Department of Environment and Science, Queensland.