

An aerial photograph of a vast sugarcane plantation. The fields are divided into rectangular plots, some of which are filled with mature sugarcane stalks showing their characteristic white and green colors. A dirt road runs through the center of the field. In the background, a body of water stretches to the horizon under a clear blue sky with a few wispy clouds.

Reef Trust Partnership Water Quality Program

Sugarcane Programs - Learnings and Recommendations Report

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**Central Resource Services
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Definition of common terms

Regional program – Made up of delivery provider projects being delivered in a defined regional area with unique targets. In total five sugarcane regional programs were delivered under the Reef trust Partnership

Project – Delivered under a regional program by a single project lead organisation with set targets relating to DIN or pesticide

Delivery Provider – Organisation involved in delivering a project under a regional program. A delivery provider can deliver multiple projects either in a single region or across multiple regions

Farm level project – Grower level project which is reported in the GBRF Dashboard System and ultimately to Paddock to Reef

Projector Tool – Cloud based prioritisation tool to assess the changes to water quality relating to changes in agricultural management practices

Paddock to Reef (P2R) – Paddock to Reef Integrated Monitoring Modelling and Reporting Program provides the framework for evaluating and reporting on the progress towards Reef 2050 Water Quality Improvement Plan

P2R Practice Change (Before and After) questions – Relates to a series of questions which describe the farming system and how it has changed under a project. Changes in the questions are described in the Projector tool and allow for the modelling of water quality improvements

The GBRF Dashboard System – A spatial reporting platform which houses the location of an on-ground project together with the responses to the P2R questions and modelled Projector outputs for DIN, pesticides and sediments.

Project Logic – Project developed conceptual framework which outlines how a project progresses from foundational activities to program level outcomes

Pathways to Adoption – Outlines the steps which a project will take and the activities or services which will be provided to each grower to support the adoption of an improved practice

Management Plan – Either a nutrient or pesticide document which provides detailed information on managing farm inputs

Executive Summary

The Great Barrier Reef Foundation funded five regional sugarcane management adoption programs between 2020 and 2024 to improve the quality of water flowing to the Great Barrier Reef. To ensure the extent and quality of the projects being delivered, an independent verification process was established to visit and discuss on-ground projects with the landholders and service providers involved. In total 11 verifications across the five regions were undertaken involving 57 farm-level projects. This report provides a summary of findings and recommendations to support future programs design and implementation of sugarcane programs.

Key findings from the project verifications

- Growers were well supported and delivery providers implemented projects in-line with Project Logics and provided the services outlined in the Pathways to Adoption document.
- Expanding delivery provider options increased engagement of new growers to Reef programs, however communication of the range of projects available and the water quality outcome of practices adopted could be improved at the outset of the program.
- Increasing the pool of delivery providers involved in the program also enhanced capability and knowledge exchange on management practices and water quality outcomes for those involved organisations.
- Growers generally seemed to appreciate the opportunity provided by the verification process to discuss their efforts to adopt improved practices and the challenges faced by the industry.
- A consistent message across programs was that growers have reduced Nitrogen rates as much as they are comfortable with, future programs should expect diminishing returns.
- Growers need more confidence in the contribution of legumes to reduce applied Nitrogen in line with the recommendations of the Six Easy Steps Toolbox.
- Resolution of P2R reporting could be improved and further support could be provided to delivery providers to ensure a consistent approach to answering P2R questions.
- Water quality monitoring supports extension to growers and improves trust in the science and the rapport between growers and scientists/extension officers.
- Treatment systems provide additional options for growers but need considerable support and oversight in design, construction and monitoring.
- Growers see the benefits of data recording platforms but limitations with digital literacy and funds can lead to dis-adoption



Introduction

The Reef Trust Partnership – a collaboration between the Australian Government Reef Trust and the Great Barrier Reef Foundation (the Foundation) – was awarded \$443 million to accelerate and amplify the efforts to protect the Great Barrier Reef (the Reef) in 2018. As a part of this investment, \$199 million was directed to improve the quality of the water from agricultural land-based runoff. In total 10 Regional Water Quality Programs were funded to respond to the priorities of the Reef 2050 Water Quality Improvement Plan. Further refinement and identification of catchment specific priorities for investment were established at the outset of the Partnership (Alluvium, 2019). Of the ten regional programs funded, five programs valued at approximately \$70M were implemented to work with sugarcane farmers to meet the catchment water quality targets. The regional sugarcane programs delivered in the Mackay Whitsundays, Lower Burdekin, Lower Herbert, Tully Johnson and the Russell Mulgrave sought to reduce the annual losses of dissolved inorganic nitrogen (DIN). Two of the five regional programs, delivered in the Mackay Whitsundays and Lower Burdekin, also had targets to reduce pesticides being lost from cane land. More information on individual water quality programs can be found [here](#).

Background

Under each regional program, delivery providers worked with growers to provide extension and support to identify management actions that maintain or improve productivity while minimising the potential for loss of inputs. Delivery providers identified project targets for either DIN or pesticide reduction to contribute to the identified program-level water quality target. Projects tracked their progress to targets using the Department of Agriculture and Fisheries Paddock to Reef (P2R) Projector Tool (<https://p2rprojector.net.au/>). The Tool allows projects to estimate the water quality improvement from a change in one or more management practices for a grower based on APSIM modelling. Utilising the Projector tool to estimate water quality improvements, each individual farm-level project was then uploaded to a spatial dashboard (the GBRF Dashboard System) which allowed delivery providers to track individual farm-level projects and for the Foundation to track each regional program's overall progress. To ensure the accuracy of what was being recorded in the GBRF Dashboard System, the Foundation engaged independent technical advisors to conduct on-site inspections and evaluations (verification) of a random selection of farm-level projects to verify the extent and quality of the on-ground actions. This report provides a synthesis of the eight regional verifications undertaken of five regional sugarcane programs over the duration of the regional program delivery.

Independent Verifications

To assess the extent and quality of on-ground sugarcane projects being delivered, an independent verification process was put in place by the Foundation and implemented by independent advisors. The selection of projects to be involved in the verification was undertaken by the Foundation through a blind selection process. The process sought to identify farm-level projects that had been involved with a delivery provider for more than one season and had answered both the 'Before and After' P2R questions. Up to five farm-level projects were selected for each delivery provider project with the delivery provider then required to identify and arrange two on-site visits. While seeking to ensure that the individual grower projects had been represented accurately in the GBRF Dashboard System based on actual practice implementation, the independent advisors also reported back to the Foundation on a broader evaluation of the programs including aspects such as communication, engagement, extent, effectiveness and legacy of project delivery. In total 57 independent verifications were conducted with 11 delivery providers being present, supporting the outcomes of the process and contributing to the learnings (Table 1).

Prior to the site verification, the independent advisor reviewed the GBRF Dashboard System to have a clear picture of the spatial boundary of the property being visited, any practice changes reported via the P2R questions, and project documentation including Project Logics and Pathways to Adoption documents.

Verifications were attended by the property owner / manager, the extension support officer, the engaged consultant, and frequently attended by a Foundation representative and the program manager or coordinator for the regional program. Most of the verifications undertaken were based primarily on assessing one-on-one extension between the delivery provider and the grower to refine management plans (whether for nutrients, pesticides or irrigation management) and identifying opportunities to improve nutrient use efficiency (NUE). A number of verifications were also undertaken on projects which sought water quality improvements via improved application of inputs e.g. Mill Mud or relating to off-site treatment systems including either natural or constructed systems and on-going monitoring of existing systems.

Table 1. Number of verifications by region.

	Verification 1	Verification 2	Total
Mackay	9	10	19
Burdekin	5	5	10
Herbert	6	10	16
Tully Johnson		8	8*
Russell Mulgrave		4	4
Total	20	37	57

*Included two verifications undertaken on a banana enterprise

Findings and Recommendations

A summary of the findings and recommendations of the verification process is provided in the table below with further background to the recommendations and a summary of the discussions of common themes across regions following the table.

Table 2. Summary of findings and recommendations

Category	Findings	Recommendations	When/Priority	Application
Project Delivery and Collaboration	Regional programs provided a range of project options which accommodated grower interest	Future programs should continue to provide a range of project options for growers to be able to pursue areas of interest and join multiple projects	Design phase	Funders
	Growers were mostly unaware of the range of projects on offer within a region and engaged in projects with a known or trusted advisor	In larger programs, create a central point to provide information to growers on a regional scale to allow for better decision-making linking grower interest and needs to delivery provider projects	Design phase	Program Manager, Partnership Coordinator
	Growers were generally unaware of the funding source and the water quality outcomes of the practice changes adopted	Project design should allow for the voluntary 'opt in' collection of participating growers emails to allow for greater information sharing and collaboration	Implementation	Program Manager, Partnership Coordinator
		Report back to growers at a relevant scale on the achievements of the program	End program	Delivery Providers, Partnership Coordinator
	Growers generally valued the opportunity provided by the on-ground verifications to discuss their farm management and meet with program managers / funding providers	Continue independent on-ground verification of projects to provide assurance that on-ground actions are being implemented and establish communication between growers, delivery providers and program managers	Implementation	Funders
	Growers are interested in what is happening in other regions	Provide annual opportunities for extension staff to visit and hear about what is happening in other regions to be able to communicate back to their growers		Funders

Extension Projects	Increasing the pool of delivery providers and the nature of projects available has supported more growers to engage in Reef projects	Support a range of projects beyond agronomic extension suited for the region, connected and coordinated to drive outcomes, identify synergies and support collaboration	Design phase	Funders
	Delivery provider knowledge and capability is improved through access to information from other projects and programs	Support collaboration within and between regional programs	Implementation	Funders, Program Manager, Partnership Coordinator
	All programs highlighted that predominantly growers have reduced their N fertiliser rates as much as they are comfortable with	Independently verify fertiliser sales data over the past 10 years to support and acknowledge grower efforts	Prioritisation process supported by R&D Program	Funders, Program Manager, Partnership Coordinator
		Reevaluate the cost effectiveness to deliver future DIN reduction based on diminishing returns from nutrient planning and the increased cost effectiveness of other DIN abatement activities e.g. treatment systems.		Funders, Modellers
	Growers often discussed the practice changes being reported as trials on parts of their farm	Use the Dashboard (or any other reporting system employed) to report only practice changes which are fully integrated into the farming system	Implementation	Delivery Providers, Program Manager, Partnership Coordinator
	Growers are cautious of the contribution of N provided by legumes and hence still reluctant to reduce N fertilisers after legumes	Provide support to increase the confidence of the contribution of N from legumes at a local scale	Prioritisation process supported by R&D Program	Funders, Modellers, Delivery Providers
Paddock to Reef (P2R) reporting	Verification across all regional programs support increased resolution of P2R reporting to better capture the nuances of the	Allow greater time for delivery providers to manage datasets and report at the most appropriate resolution	Implementation	Funders, Modellers

	extension being provided inc. addressing constraints and variable rate, and changing management practices or infrastructure across farms			
	Delivery providers used a number of approaches to establish historical or 'before' yields. Equally, delivery providers acknowledge uncertainty is estimating 'after' yields	Provide guidance to delivery providers on the best approach to determining both before and after yields	Implementation	Funders, Modellers,
Water Quality Monitoring	Water quality monitoring at a range of scales was seen by growers as useful to support decision making, however it was unclear how results were communicated and related back to an individual farm	Establish a technical advisory group from the beginning of the program to support the design of any water quality monitoring and ensure rigorous and consistent approaches in collection, interpretation and communication of results back to growers and the wider community.	Design phase	Funders
		Water quality monitoring plans should be commensurate to the cost of the monitoring prior to implementation to ensure cost effectiveness and collection of suitable data for interrogation.	Design phase	Funders, Technical Advisors
Treatment Systems	Pollutant reduction outcomes from treatment systems cannot be captured by Projector and while they are likely to be effective, initial estimates seem overly optimistic	Ensure that methods to assess pollutant reductions and monitoring plans are reviewed by a technical advisory group to ensure estimates are realistic and collection of monitoring data is fit for purpose	Future R&D Program	Funders, Technical Advisors

	Construction and evaluation of treatment systems are highly reliant on technical expert input at all stages including design, construction, monitoring and evaluation	Ensure that treatment systems have access to technical experts to minimise risk and maximise outcomes, and to provide linkages to other sites and projects	All phases	Technical Advisors
	Total cost including labour and material, and future maintenance costs should be compiled	Projects need to compile the full cost of construction including maintenance and share this information with the wider wetland / treatment systems community	End of program	Delivery Providers, Technical Advisors
Data recording and technology	Growers consistently highlighted their limitation with technology and mentioned the need for follow up support to continue using digital platforms after project completion	Ensure adequate advice is provided for within projects to better understand and utilise data platforms and provide more one on one time and follow up with the growers to ensure that they are comfortable using the platform following the completion of the project.	Implementation	Funders, Delivery Providers
	Growers have an interest in the greater use of digital recording platforms	Identify training opportunities to improve growers use and knowledge of digital technology. This should include non-cane-based platforms such as Queensland Globe etc.	Implementation	Funders, Delivery Providers
	Internet connectivity was highlighted as a barrier for adoption of precision agriculture	Explore the use of emerging technology such as Starlink for future programs to increase connectivity and data sharing for Internet of Things (IoT).	Innovation Program	Funders

Background to Recommendations

Project Delivery and Collaboration

Overall, the verifications conducted found that individual farm-level projects were progressing well and generally reflected what was being reported in the GBRF Dashboard System. Projects were also being delivered in-line with the individual Project Logics and Pathways to Adoption documents which each project developed at the outset of the program.

The individual verifications found regional programs provided a mix of projects which were fit for purpose and suitable to the region deployed, building on past work and increasing the options available for growers to engage. While a range of on-ground projects were available within each regional program, there often appeared to be limited knowledge by growers on the project options available. Often growers were approached by a delivery provider to be involved in their project rather than having the opportunity to assess what project would be the best fit based on the approach and grower interest and needs. Additionally, the access to information on what each on-ground project offered was limited reducing growers' ability to make an informed decision. It is essential for the long-term adoption of improved practices that there is a good understanding between the delivery provider and the grower including areas of interest, expectations and limitations of the extension being provided.

Despite such knowledge limitation among growers, the verification process found there were a number of growers involved in more than one project often with multiple delivery providers. This allowed growers to pursue multiple areas of interest into their farming system increasing productivity and water quality benefits. This approach however often made reporting more complicated as a grower could have multiple polygons overlaying the same area, multiple responses to the P2R questions and different grower ID's. These inconsistencies can be exacerbated with limited communication between delivery providers.

While it was clear that growers valued the support provided, growers from across the sugarcane programs were generally unaware of the source of the funding and the water quality outcomes from the changes in management practices they are making. If delivery providers open the conversation linking practice change back to water quality outcomes this will likely increase grower knowledge and understanding between farming decisions and environmental effects and develop trust between growers and advisors.

Overall, growers involved in the verification generally seemed to appreciate the opportunity to discuss their engagement and highlight the challenges and outcomes of their involvement.

Extension projects

Increasing the number and the nature of participating delivery providers, including agribusiness, industry, NRMs, universities, and research organisations, appears to have increased the number of growers participating in Reef funded projects for the first time. This demonstrates the program goes beyond extension support and caters for other on-ground needs and gaps in a single collective regional program.

Growers generally advised that they have a preferred extension provider who they engage with for general agronomic support.

Increasing the pool of available delivery providers has not only supported greater inclusion of growers but has also improved delivery provider capability, interaction and knowledge around

water quality matters as a number of delivery providers were involved in a Reef water quality program for their first time.

A consistent message across regional programs was that growers have reduced N fertiliser rates as much as they are comfortable with. Growers are now fine-tuning fertiliser rates which have come down significantly from historical rates. The implications are that DIN savings through N reductions are close to exhausted and are in the realm of diminishing returns. Acknowledging this information comes from a reduced sample, it indicates that future programs on DIN reductions will largely have to focus on Nutrient Use Efficiency (NUE) improvements and off paddock treatment.

When discussing practice change with growers, they frequently referred to the ‘trials’ they were implementing based on the recommendations from the Nutrient Management Plans or extension support provided. While growers consistently highlighted that they were implementing the plans, the fact that they are considered trials suggest that they are not fully accepted and integrated into the farming system.

A common management practice change across programs was increasing the use of legume fallows prior to plant cane. While this increasing use of break crops provides many benefits and has been well taken up in most regions, growers highlighted uncertainty in reducing N fertiliser rates following a good legume fallow. The GBRF Dashboard dataset suggests that there is the potential to inadvertently increase the pool of N which is available to be lost. This suggests that more support and local data collection and analysis needs to be carried out to allow growers to have the confidence to reduce N in line with the Six Easy Steps Toolbox following a good legume fallow.

Paddock to Reef (P2R) reporting

The verification found that there is opportunity to improve the resolution of reporting to Paddock to Reef and additional support could be provided to ensure a consistent approach responding to the yield related questions. Improving the resolution will ultimately better reflect actual changes where they have occurred and improve confidence in the model to capture practice change. However, improving the resolution will add additional time requirements to delivery providers reporting on the dataset.

Through the verifications it was evident that some farms which were separated by distance and with different infrastructure e.g. irrigated vs dry-land, access to mill mud etc., have been reported as a single farm and have answered the P2R questions with the ‘most common’ practice across farms reported. Separating farms as discrete reported polygons will improve the quality of data provided to P2R by allowing the management actions of each polygon or farm to better reflect how the farm is being managed. While there is an increased time requirement for this improvement in resolution, much of the farm level information can be collected during the usual grower engagement without adding onerous time impacts to the grower.

Equally, addressing soil constraints was a common approach for delivery providers to support growers providing both a water quality benefit and a productivity outcome. Identifying and addressing soil constraints should result in improved nitrogen use efficiency (NUE) either through addressing the constraint thereby improving productivity or by understanding the limitations of the soil and better matching the fertiliser rates to the yield potential. However, estimating DIN savings from improved NUE of a paddock across a whole farm can lead to an overestimate of DIN saved when not all blocks with constraints are treated or if some blocks are

already performing at optimum NUE. As not all constraints are consistent across blocks, breaking the reported polygons into smaller blocks allows for reporting of areas as they are realistically managed and for the data provided to accurately reflect the area managed for the constraint.

Another observation from the verifications was the range of approaches used to determine yields for reporting to P2R. Approaches included grower informed, last year's productivity data, or averaging productivity data for each crop class using between 3 to 10 years of historical yields supplied by the mill. Additionally, a number of delivery providers highlighted their uncertainty in determining the expected or 'after' yields from their extension and how to remove any seasonal impact. Providing direction to delivery providers on the best approach for calculating before yields and estimating any yield increase based on extension will provide consistency across projects further improving the confidence in the reported dataset.

While the verifications found that overall delivery providers reporting P2R data reflected conversations with the growers, small improvements in resolution and a consistent approach to inputting yields will provide greater confidence in the data being reported.

Water Quality monitoring

Water quality monitoring was a significant component to several projects visited as a part of the verification. Projects have undertaken monitoring at a range of scales intended to provide feedback to growers to increase understanding around pollutant losses in farming, break down barriers between landholders, agronomic providers and scientists and add knowledge to better understand the efficacy of treatments. Additionally, monitoring ranged from paddock scale, seeking to reflect actual water quality improvement as a result of changes in management practices, to wider catchment or multi-farm monitoring including monitoring of wetlands both natural and constructed and drains.

The monitoring was undertaken by several organisations with varying levels of expertise and with varying levels of cost and technology depending on the intent of the monitoring. Opportunities for sharing information between projects on design, data interpretation would likely improve project outcomes and increase knowledge of on-ground staff.

Projects had a varying level of project documentation commensurate with project cost. This ranged from paddock trial plans utilising pit fall samplers to more detailed technical plans encompassing the use of automated samplers and real time monitoring equipment. Future projects would benefit from technical support provided from the outset to assist in the design, set up, data collection and interpretation, consistent messaging and appropriate communication back to growers.

The verification found that the water quality monitoring was appropriate for the intent and resolution required. When discussing water quality, growers directly engaged were supportive of the monitoring and comfortable in discussing the results.

Treatment systems

A number of projects involved in the verifications were treatment system projects. These projects aim to better understand and quantify DIN abatement from the capture and processing of runoff in natural or constructed wetlands or through controlled drainage systems i.e. ability to retain, store and release runoff either through adjustable or fixed weirs at the inlet and outlet.

The verification found that the treatment system projects are likely to contribute additional DIN savings. However, the efficacy of these systems to improve water quality is still being determined and requires sufficient technical knowledge and support. While the RTP Water Quality Program supported the inclusion of these systems as a component of regional projects, the verification process uncovered the DIN savings originally estimated were rather optimistic. Future projects should be strengthened through a research and development program including robust monitoring plans for the collection of all required project data.

For one treatment system site, the verification found the budget allocated to data collection and analysis was constrained which, when interrogating the data would require extrapolation leading to increased uncertainty. Overall, treatment systems are still under development and need to be well resourced to ensure valuable information is produced.

Design and construction of these systems also requires considerable technical support to maximise and ensure intended outcomes. In high rainfall events these structures are prone to fail if not constructed properly. To minimise risk, treatment structures need to be constructed to design ensuring levels are exact and release points adequately protected. While there is still much uncertainty on the efficacy and cost effectiveness of these structures, delivery providers should document the full cost of constructing these structures including design, construction and any follow up maintenance.

The verification also highlighted how beneficial the inclusion of these systems is in improving the rapport between scientists and growers leading to improved knowledge and working relationship. It was evident from the verifications that growers had been involved in the process of selecting the sites and the types of interventions. Consequently, the growers visited had a high level of ownership of the project sites and knowledge of other suitable locations where treatment systems could be constructed.

Overall, the verification process found that the inclusion of these structures provides additional benefit to a regional program and value adds to the agronomic extension being provided in the region.

Data recording and technology

A number of projects being delivered across all regional programs supported growers to adopt digital recording platforms. When discussing the use and integration of data recording platforms e.g. LiquaForce LAND HUB, MAPS Agtrix, Irrigation platforms in both Mackay and the Burdekin, etc., growers consistently highlighted their limitation with technology as a barrier and a potential reason of dis-adoption. While growers recognised the value of these systems in terms of recording management actions or mapping and supporting informed decision making, there was a consistent message during verifications of the need for increased support time during the project and often for follow up support to continue using the platforms after project completion.

Further, it was also evident that some growers will need funding from water quality programs to maintain use of the platforms adopted, while others (mainly the larger more entrepreneurial farms) indicated a willingness to continue the rapport with their preferred provider platform using their own funding.

A number of growers also expressed interest in upskilling in the use of other digital spatial technology such as Queensland Globe to be able to better manage spatial data that is being collected through precision agriculture. Future program should ensure that enough time is

provided to support growers adopt these new digital platforms to the extent that growers are comfortable using the platforms when the program has finished. Equally, program managers should identify additional learning opportunities for growers across a program to increase digital literacy and support the collection, storage and utilisation of digital datasets.

During the verification of the Tully Johnson program growers highlighted the limitations with existing Wi-Fi technology in regard to connectivity across a farm and the associated cost with connecting a single machine required to implement precision agriculture. Increasingly growers need to be able to access connected technologies to enable precision agriculture across multiple devices and machines over large areas of farm however, both knowledge and cost was identified as a barrier. Currently there is technology i.e. Starlink to be able to create local Wi-Fi networks to connect a number of machines over large areas with exceptional precision. This requires support to take this technology to technical maturity and make it available to growers or clusters of growers for wide scale adoption. Future programs should consider the potential of technologies such as Starlink in an innovation project to take this technology to technical maturity and adoption by growers.

Summary of Discussions

During the verification a number of additional questions were asked to grower participants. This included a range of topics relating to their participation in the project, communication, engagement, extent, effectiveness and any legacy outcomes recognised by the growers. A summary of common points across all programs are provided below

Communication

- Industry bodies (SRA, CANEGROWERS, Prod boards) can cast a broad net to promote the program and projects due to a database of all growers. Growers were made aware of the project through text messages and emails
- All growers advised of a close working relationship with their Delivery Provider and the ability to contact and ask questions relating to the advice being given
- Growers have limited knowledge of the range of projects available, particularly in the larger programs
- Minimal discussion between Delivery Providers and growers regarding the water quality links to their practice change or funding arrangements
- Projects have heavily relied on existing or past relationships to encourage growers to participate.

Engagement

- All growers noted the relative ease of getting involved including the on-boarding process
- Regulations and record keeping are key factors for growers to get involved, cost of inputs was also highlighted as a key driver
- Growers with a history of engagement in Reef projects indicated an understanding of P2R and reporting requirements
- Growers across the regions have highlighted that they were pleased to be visited and talk about what they are doing on their farm.
- Saving time was a key driver for Burdekin irrigation projects participants.

Extent

- Delivery Providers highlighted refining rather than reducing rates along with addressing soil constraints are the focus in planning to improve NUE

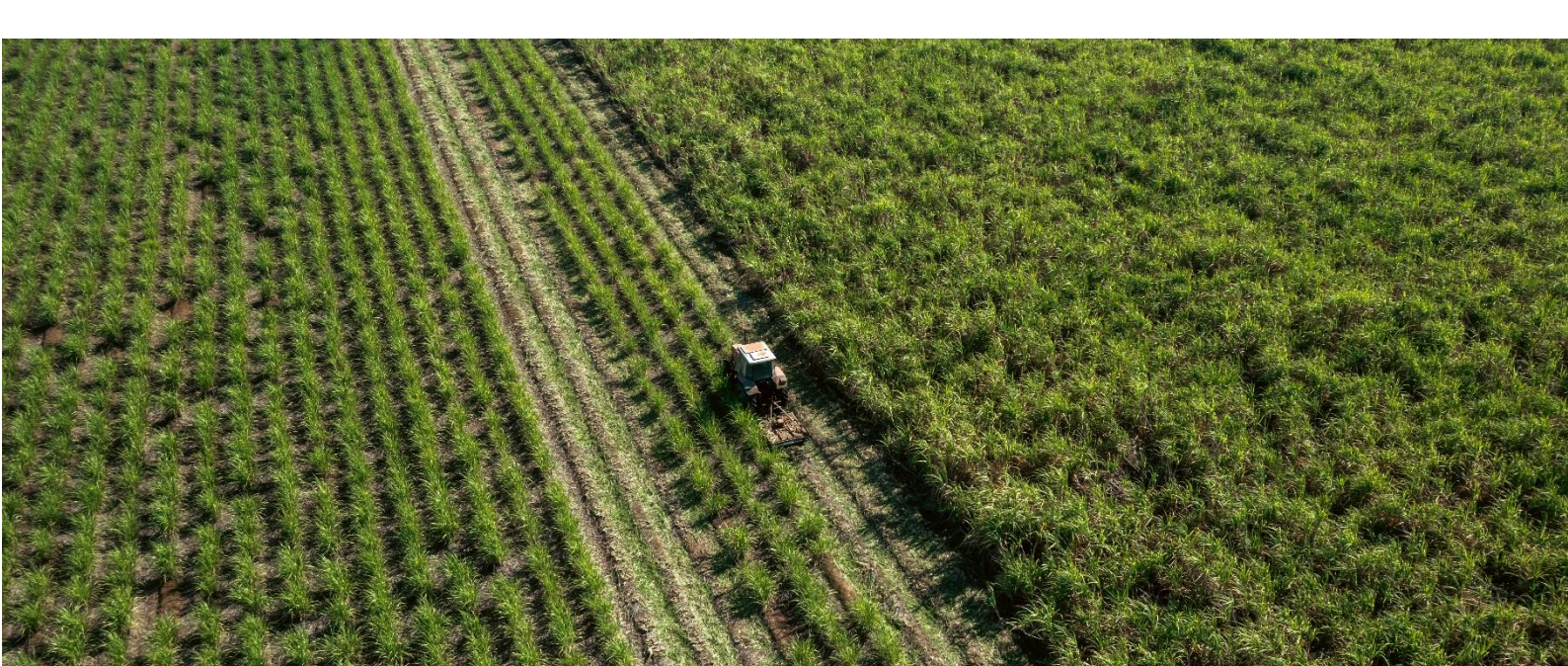
- Farms separated by distance are often reported as a single project. When reported as multiple projects, can have multiple landholder ID's which leads to difficulty tracking actual number of growers involved
- Some practice change reported is being trialled with the intent to expand if proven successful e.g., reducing N rates on older ratoons, reduced rates of Mill Mud etc.
- All projects reported to be progressing well in their Program Logics and Pathways to Adoption with growers aware of the support available. Season or supply chain issues have caused some delays
- More growers in the Lower Burdekin working across multiple projects (e.g., irrigation, N&P) with some in Mackay-Whitsunday. In the Lower Burdekin there were single polygons reported when a grower was involved in two or more projects while in the Mackay Whitsunday multiple overlapping polygons uploaded by each delivery provider have been reported.

Effectiveness

- All regions' growers noted relative ease in following their plans but highlighted that it is considered against productivity before being fully adopted
- Retailer recommendations for alternative products can prevent growers from following their plan (cost / availability etc) particularly for pesticides but also nutrients
- Growers indicated they don't have the time or knowledge to implement changes alone, particularly for irrigation projects but also pesticide (selection and buffers) and nutrition (soil constraints)
- Some practices discussed were not reflected in the GBRF Dashboard System suggesting the platform needs updating more frequently including progress indicators
- Commentary about Nutrient Management Plans being a regulatory burden were infrequent, with the NMP generally considered a useful tool for management decision and planning

Legacy

- Collection and use of farm data to assist in decision making. e.g. EM Mapping, drone imagery, systems audit etc. across all regions
- Automated irrigation in the Burdekin increased from 150 ha to over 1500ha
- 40% of available cane land in the Pioneer and Plane basins engaged
- Planting legumes in the Herbert has increased from 3% to roughly 33% when the opportunity arises.
- Mill Mud spread further afield in the Herbert due to the new spinner trucks
- Development of new tools iRAT, Pesticide Decision Support Tool, Agtrix N and P budget, LAND platform, etc.



Appendix A: Details of Verification

Dates of the verifications:

Verification	Dates	Undertaken by
Mackay Whitsundays	28 th October - 30 th November 2021	Central Resource Services
Lower Herbert	20 th – 21 st April 2022	Central Resource Services & GBRF Technical Advisor
Lower Burdekin	19 th – 20 th July 2022	Central Resource Services
Lower Herbert	8 th March – 10 th March 2023	Central Resource Services & GBRF Technical Advisor
Mackay Whitsundays	20 th April – 18 th July 2023	Central Resource Services
Lower Burdekin	26 th – 27 th April 2023	Central Resource Services
Russel Mulgrave	5 th December 2023	GBRF Technical Advisor
Tully Johnson	19 th – 21 st March 2024	GBRF Technical Advisor

Delivery Providers involved:

- Farmacist (Mackay, Burdekin & Mulgrave Russell)
- Mackay Area Productivity Services (MAPS)
- Herbert Cane Productivity Services Ltd (HCPSL)
- Burdekin Productivity Services (BPS)
- Catchment Solutions (Mackay & Herbert)
- Sugar Research Australia (Mackay & Burdekin)
- CANEGROWERS (Mackay, Herbert & Innisfail)
- LiquaForce (Mackay, Herbert & Tully)
- Agro Group (Herbert)
- Agritec Solutions (Burdekin)
- James Cook University (JCU) (Russell Mulgrave & Tully Johnson)
- Terrain NRM (Tully Johnson)