Evaluation of Reef Trust Partnership Regional Water Quality Program - Major Grants Projects

Report for

the Great Barrier Reef Foundation

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Acronyms

BBIFMAC	Burdekin Bowen Integrated Floodplain Management Advisory Committee
BIP	Burdekin Irrigation Project
BMP	Best Management Practice
DAF	Queensland Department of Agriculture and Fisheries
DIN	Dissolved Inorganic Nitrogen
GBRF	Great Barrier Reef Foundation
HCPSL	Herbert Catchment Productivity Services Ltd.
i-RAT	Irrigation Rapid Assessment Tool
MAPS	Mackay Area Productivity Services
PCPSL	Plane Creek Productivity Services Ltd.
PDST	Pesticide Decision Support Tool
P2R	Paddock to Reef
RCL	Reef Catchments Ltd.
RTP	Reef Trust Partnership
RU	Risk Units
SRA	Sugar Research Australia

Executive summary

The Reef Trust Partnership (RTP) is a six-year, $443m partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation (GBRF). One component of the RTP is a $199M investment to improve water quality from agricultural land-based runoff. As part of the RTP Water Quality program, 10 regional programs were funded to respond to the priorities of the Reef 2050 Water Quality Improvement Plan (2018)[1]. Locations and priority activities for investment were established at the outset of the program (refer Alluvium, 2019)[2]. Of the ten regional programs, five programs (valued at approximately $70M) were implemented to work with sugarcane farmers to meet catchment water quality targets. Three of those regional programs included a Major Grants Project: Mackay Whitsunday, the Lower Herbert and the Lower Burdekin. Major grants complement other regional water quality activities, such as extension services, by providing incentives to stimulate private investment in infrastructure and machinery associated with the adoption of irrigation, nutrient and pesticide practices that improve water quality.

This evaluation supplements the other monitoring and evaluation activities conducted by and for GBRF by providing a discrete, independent evaluation of the three Major Grants Projects, with a focus on evaluating outcomes and identifying learnings that can inform future grant programs. The evaluation framework addressed seven key evaluation questions and drew on multiple lines of evidence from program documentation, acquittal spreadsheets, grower surveys, Paddock to Reef (P2R) management practice datasets and interviews with project managers and delivery providers. When this evaluation was conducted not all regional programs or datasets were complete, however, so this has constrained the analysis reported here.

The Major Grants Projects applied a new approach to supporting practice change in three cane growing areas in the Great Barrier Reef. The grants were designed to complement agricultural extension projects, required at least 50% grower cash co-contribution and were assessed on their water quality benefits. Regional Major Grant Project budgets were between $1.5M and $2.5M. All regions focussed on reducing Dissolved Inorganic Nitrogen (DIN), and Mackay Whitsunday also targeted pesticides. A novel feature of the RTP water quality program was embedding water quality targets and cost-effectiveness measures (e.g. $/kg pa DIN) into major grant and extension delivery provider contracts.

There were many challenges to the implementation of the new approach, particularly assessing and accounting for water quality savings, which used the P2R Projector Tool[3] to estimate water quality benefits. The P2R Projector Tool doesn't account for DIN savings when new infrastructure and/or machinery is incorporated but rather the ability for growers to adopt and sustain improved practices that requires such implements. In some cases (e.g. Stoolzippas, irrigation practices and change of pesticide products) the P2R Tool was not able to estimate the water quality benefits. Interdependencies between the grant program and

[1] State of Queensland and Commonwealth of Australia. (2018). *Reef 2050 Water Quality Improvement Plan 2017-2022*. Brisbane

[2] Alluvium. (2019). *Effective and Efficient Pathways for Investment in Improved Water Quality in the Great Barrier Reef: Final Report.* Brisbane

[3] https://p2rprojector.net.au/

other regional projects were also problematic because of the additional workload placed on delivery providers and accounting for water quality savings (which were part of contractual agreements). Grant managers worked with GBRF and extension delivery providers to adjust programs in response. Changes to grant criteria and delivery arrangements were significant in the Mackay Whitsunday region (which pioneered the new approach) and the Lower Burdekin.

Each region adopted slightly different arrangements for accounting for water quality savings between on-farm grant projects, and between delivery providers and the major grant administrating organisation. All regions used a system of 'batching' projects so that cost-effectiveness benchmarks were met overall but not necessarily by individual projects. All programs met their water quality targets and almost all cost-effectiveness benchmarks. Some of the nutrient and pesticide accounting approaches limited the ability to attribute water quality savings, particularly in the Mackay Whitsunday region.

Feedback from growers was very positive. Across all regions >80% of growers said they found the grant application process easy or very easy, and appreciated the support given by delivery providers. About a third of growers said they wouldn't have adopted the practice without the grant. Almost all growers thought it would be easy or very easy to maintain the practice going forward.

Despite the implementation challenges, program managers and delivery providers are proud of what the Major Grants Projects achieved.

This report details the delivery arrangements and achievements for each region. Findings are summarised across regions and key evaluation questions assessed. Learnings and recommendations are offered for the consideration of future grant program commissioners and managers. The recommendations are summarised below:

1. Consider how regional governance arrangements can support appropriate oversight and accountability, access to local knowledge and networks, but also enable flexibility and adaptation.

2. Centralise (at the regional scale) a grant administration role that can lead grant administration and assessment processes, coordination of the regional delivery network, reporting of activities and outcomes, regional monitoring and evaluation and public communications

3. Interdependencies between grant programs and other regional programs should be recognised and contracted appropriately.

4. Carefully consider the value of large grants in each regional context (i.e. enterprise characteristics including current practices and prospects for change). Invest in up-front planning to identify where grants will overcome financial barriers to adoption and add value to other incentives.

5. Grants should be linked to appropriate extension support and include a significant grower co-contribution (>=50%). Consider the trade-offs of different grant amounts (minimum and maximums) including equity issues.

6. Assess grants for water quality benefits but strengthen assessment methods to overcome the limitations of the P2R Projector Tool.

7. Rules about how water quality benefits are assessed, aggregated, and allocated should be determined before the grant program is contracted. Individual on-farm grant projects need to be able to demonstrate their value for public investment in water quality outcomes, and accounting rules need to assess this in transparent, consistent and defensible ways.

8. Apply a set of common monitoring and evaluation measures across similar regional grant projects to allow comparative analysis. Ensure appropriate data collection protocols and training, and common project identifiers across related datasets.

1. Introduction

1.1 Reef Trust Partnership regional water quality programs

The Reef Trust Partnership (RTP) is a six-year, $443m partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation (GBRF). The objective of the RTP is to achieve significant, measurable improvement in the health of the Great Barrier Reef, in accordance with the Reef 2050 framework and underpinned by innovation, science and community engagement.

One component of the RTP is a $199M investment to improve water quality impacting the Great Barrier Reef World Heritage Area through activities that improve farming practices, reduce fertiliser use and increase uptake of new technology and landscape restoration.

The RTP Water Quality Program established 10 regional-specific programs that focussed on reducing end of catchment loads of dissolved inorganic nitrogen, fine sediment, and pesticides in priority areas. Locations and activities for investment established at the outset of the Program (see Alluvium, 2019).

The Program embedded water targets in the design, delivery and evaluation of the regional programs. The allocation of funding was primarily based on the cost-effectiveness of activities and performance was measured as water quality and cost-effectiveness targets for each project. The Program also adopted a novel governance model for the regional water quality programs that separated roles for program management, partnership coordination and project delivery functions, described in Clear Horizon's (2022)[4] Mid-term evaluation (Figure 1).

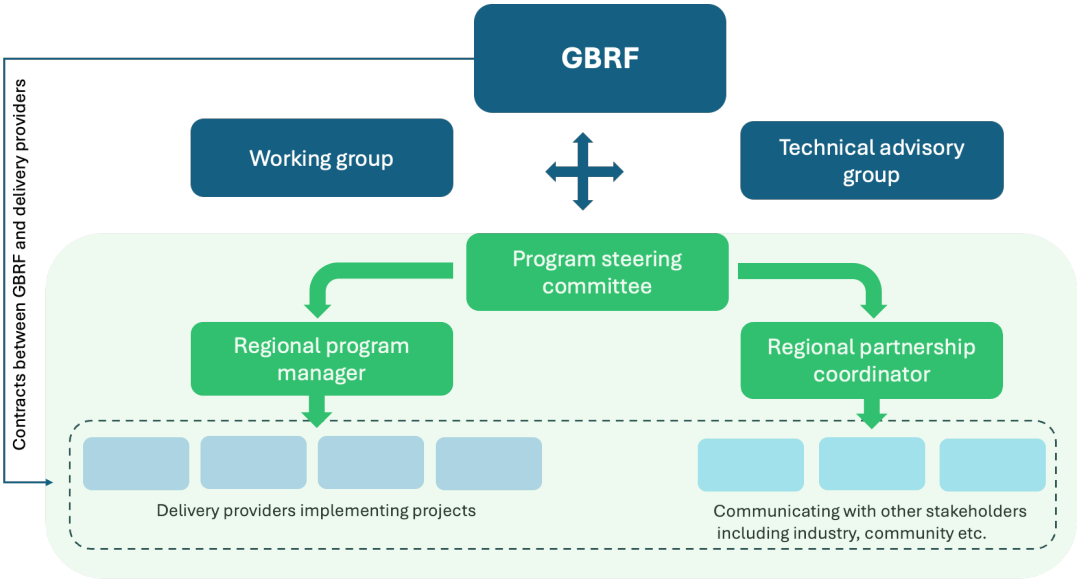

Figure 1. RTP governance model for regional water quality programs

[4] Clear Horizon (2022) Reef Trust Partnership 2021 Mid-term evaluation. Clear Horizon, Melbourne.

Regional Program Managers were responsible for overseeing the implementation of projects under regional programs and ensuring timely delivery and reporting. Regional Partnership Coordinators support delivery providers in connecting with other partners and relevant stakeholders, including landholders. Regional Partnership Managers and Coordinators interact and support delivery providers, who are responsible for implementation of on-ground water quality projects. Regional program design was guided by the RTP Monitoring and Evaluation Plan (Reef Trust Partnership, 2022)[5]. Each region has a program logic that articulates how funded activities contribute to achieving regional outcomes.

Clear Horizon (2022) evaluated the effectiveness of these arrangements, particularly the embedding of water quality targets, and found that "The use of water quality targets in GBRF's approach to the RTP Water Quality component contribute to several elements which strengthen the accountability and transparency of investment decisions" (p.2).

1.2 Major Grants Projects

Three regional water quality programs included Major Grants Projects: Mackay Whitsunday, Lower Herbert and Lower Burdekin. Incentive grants complement other regional water quality activities e.g. extension services, by providing incentives to stimulate private investment in infrastructure and equipment necessary to enable broadscale adoption of improved irrigation, nutrient and pesticide practices. Funding is competitive. Projects are ranked according to cost-effectiveness using the Paddock to Reef (P2R) Projector Tool to estimate water quality benefits.

1.3 This evaluation

The focus of this evaluation is on the learnings from the three Major Grants Projects, and supplements other monitoring and evaluation activities undertaken by and for GBRF.

The next section of the report outlines the evaluation methods used. Findings are then presented, firstly overall, then by each region. Finally, key findings are summarised, and learnings presented.

[5] Reef Trust Partnership (2022) *RTP Monitoring and Evaluation Plan, updated October 2022*. Great Barrier Reef Foundation, Brisbane.

2. Methods

2.1 Logic of Major Grants Projects

While each Regional Water Quality Program has its own program logic, there is a common logic underpinning all the Major Grants Projects (Figure 2). The Major Grants Projects were designed to overcome financial barriers to the adoption of improved agricultural practices that reduce water quality risk. The Major Grants Projects were expected to support the purchase, modification or upgrade of machinery, equipment or technology that enables the adoption of improved agricultural practices. The Major Grants Projects were delivered alongside extension services which seek to provide growers with relevant skills and knowledge.

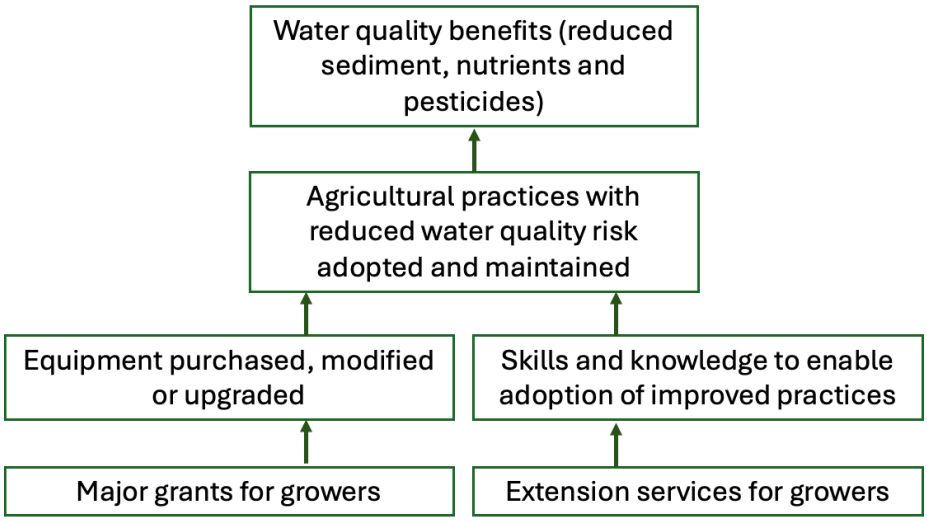

Figure 2. Generic program logic for Major Grants Projects

2.2 Evaluation framework and data sources

Seven key evaluation questions were identified by GBRF:

- What practices were enabled by the Major Grants Projects?
- To what extent can the Major Grants Projects demonstrate additionality?
- To what extent are practices likely to be enduring (legacy)?
- What were the additional projected/modelled DIN and pesticide reductions, and pesticide toxicity improvements enabled through the grants?
- Are program management arrangements effective?
- What is the cost-effectiveness of the Major Grants Projects?
- What unintended outcomes (positive and negative) have resulted from the Major Grants Project (if any)?

The key data sources were:

- Grant acquittals spreadsheets
- Project documentation – project plans, monitoring and evaluation plans, grant guidelines, progress reports and final reports
- Grower surveys of grant recipients (designed as part of this evaluation, surveys were collected by regional project staff)
- P2R practice change data
- Interviews with
    - GBRF Program Managers (1 focus group with 4 participants)
    - Regional Program Managers and Coordinators (5 interviews with 6 participants)
    - A selection of extension delivery providers and subcontractors that interacted with the Major Grants Projects (4 interviews and 1 online survey),

2.3 Limitations

The primary limitation of this evaluation has been the availability of data and the ability to trace the water quality benefits of the individual farm-level grants (Table 1). At the time of finalising the report most datasets were still in flux. Specifically:

- Grant acquittal data has required clarification and revision by regional managers
- Some final project reports were not yet available
- Grower surveys for major grant projects were incomplete
- P2R practice change data were incomplete
- Project codes used to link datasets were problematic in the Mackay Whitsunday region where two versions of codes were in use.

Table 1. Summary of data availability for this evaluation

Region	Number of grants	Major Grants Project grower survey	P2R practice change survey	Final report and acquittals
Lower Burdekin	33	32	33	yes
Lower Herbert	94 (53 complete, 41 in progress)	50	48	no
Mackay Whitsunday	72 (68 complete, 4 in progress)	55	71	draft
Total	**200**	**137**	**152**	**n/a**

3. Overall findings

This section summarises and compares the approach and outcomes across the three regional Major Grants Projects.

3.1 Delivery arrangements

The key differences in delivery arrangements across the three regions are summarised in Table 2 overleaf. In all regions the Major Grants Projects were funded as part of a Regional Water Quality Program overseen by a program steering committee. There was a regional administrator of the Major Grants Project in each region, who worked with other regional delivery providers. Regional Major Grant Project budgets ranged from $1.5M to $2.5M. All regions focussed on reducing DIN, and Mackay Whitsunday also had pesticide targets. Targets varied across regions and were amended during the program in both the Lower Herbert (targets increased) and Mackay Whitsunday (balance of grants between DIN and pesticides changed, pesticide units changed). Cost-effectiveness benchmarks were developed for each region based on previous experience, and in some cases, these were adjusted during the project.

All projects required a cash co-contribution from growers of at least 50%. In the Lower Herbert this included a standardised calculation of in-kind contributions. All regional programs experienced some early challenges in delivery arrangements, particularly the assumption that extension project delivery providers would absorb support for the major grants into their existing contracted delivery. A few delivery providers declined to support the Major Grants Projects. Delivery providers were concerned about their capacity to service the additional workload. All regions needed to adjust their program as a result. Mackay Whitsunday (the first Major Grant Project to commence) made the most adjustments – changing grant caps, eligibility criteria, catchments and targets. The Lower Herbert program was tied to completion of Smartcane Best Management Practice (BMP) accreditation, which was not the case in other regions.

Each region adopted slightly different arrangements for accounting for DIN (and pesticides in Mackay Whitsunday) between projects, and between delivery providers and the major grant administrating organisation. All regions used a system of ‘batching’ projects so that cost-effectiveness benchmarks were met overall but not necessarily by individual projects. This was applied most widely in the Mackay Whitsunday region, to the extent that it was not possible to disentangle the water quality benefits of major grant projects from associated extension projects.

Table 2. Summary of regional delivery arrangements

Region	Mackay Whitsunday	Lower Herbert	Lower Burdekin
Program Manager	Independent consultant (Central Resource Services).	GBRF	GBRF
Major Grants Project manager	Reef Catchments Ltd	CANEGROWERS Herbert River	NQ Dry Tropics
Total project budget	$2.5M	$2.1M	$1.5M
Focus	DIN and pesticides	DIN	DIN
Water quality targets	DIN:2,600 kg pa Pesticides: 732,500 RU pa	DIN: 6,375 kg pa	DIN: 4,800 kg pa
Cost-effectiveness benchmarks[6]	DIN: $283 / kg DIN Pesticides: $2.10 / RU	$329/kg DIN	$234 / kg DIN Irrigation projects $312 / kg DIN[7] Nutrient projects $131 / kg DIN[7]
Number of grant rounds	3 phases	4 rounds	3 rounds
Grant cap	$20,000/$30,000/no cap but sliding scale	$25,000	$30,000
Co-contribution required	≥50% cash contribution	≥50% cash contribution (with in-kind component)	≥50% cash contribution
Grant paid as	50% up front, 50% on acquittal	50% up front, 50% on acquittal	rebate on acquittal
Open to	Initially open to growers engaged by regional delivery providers in select catchments. Then opened to additional catchments and Smartcane BMP accredited growers	Open to all Lower Herbert canegrower. Growers were required to demonstrate or achieve Smartcane BMP accreditation	Round 1: Growers engaged by delivery providers Round 2: Growers engaged by SRA Round 3: Open to all growers but agronomic support required
Accounting for water quality savings between projects and	Projects were aggregated ('batched') so that water quality benefits could be assessed for the batch,	Some batching of grant projects for collective assessment.	Some batching of grant projects for collective assessment.

[6]Overall cost effectiveness is calculated as the total grant project costs (grants and grant delivery costs) per water quality savings.

[7] In addition to overall cost-effectiveness, the Lower Burdekin Major Grants Project also had on-ground cost-effectiveness benchmarks for irrigation and nutrient management projects. These are calculated as the total grant costs per water quality savings for each type of project (excluding some grant delivery costs that cannot be allocated across project types).

Region	Mackay Whitsunday	Lower Herbert	Lower Burdekin
between delivery providers.	rather than by individual project. Batching was used extensively Water quality savings were shared between the regional grant manager (Reef Catchments Ltd) and regional delivery providers e.g., 70:30% split	DIN savings were allocated to the first organisation to engage the grower (CANEGROWERS Herbert River or regional delivery providers)	DIN savings were allocated to regional delivery providers
Additional assessment methods used	Pesticide Decision Support Tool (PDST)		Irrigation Rapid Assessment Tool (i-RAT)

3.2 Grower surveys

While the grower surveys are not complete, some interesting commonalities and differences are highlighted (Table 3). Participating growers in the Lower Herbert were generally older (than those in other regions) and most had not previously participated in a water quality program. This may explain why half of those surveyed opted out of the voluntary survey (all growers in the other regions were willing to participate). In comparison, growers from both the Lower Burdekin and Mackay Whitsunday regions came from a wider range of ages with some younger growers participating. Most growers in the Lower Burdekin and Mackay Whitsunday regions had previously participated in a water quality program. Across all regions at least 25% of growers reported that this was the first time they had participated in a water quality program.

Major grants were not designed to promote participation in extension projects but were designed to complement those projects (and ensure that growers receiving grants had agronomic support). In the Mackay Whitsunday region (the only region where this survey question was asked) most growers said that the major grants strongly influenced their decision to participate in the program.

Most growers heard about the Major Grants Project directly from CANEGROWERS Lower Herbert (in that region) or from other regional delivery providers (in the Burdekin and Mackay Whitsunday regions). The other main source of information about the project was family members or other farmers. Across all regions more than 80% of growers said they found the grant application process easy or very easy, and appreciated the support given by delivery providers.

Consistent across regions, about a third of growers said they wouldn't have adopted the practice without the grant, and another third said they would have adopted in the next three years. The balance said they would have adopted but in a longer time frame, or that the grant allowed them to adopt the practice over a wider area. This is consistent with

research findings[8] (and the views of program managers) that grants have allowed growers to bring adoption decisions forward and helped overcome financial barriers to adoption. Almost all growers thought it would be easy or very easy to maintain the practice going forward.

[8] Dean, A. J., Eberhard, R., Baresi, U., Coggan, A., Deane, F., Hamman, E., Helmstedt, K. J., Loechel, B., Jarvis, D., & Mayfield, H. (2023). Scrutinizing the impact of policy instruments on adoption of agricultural conservation practices using Bayesian expert models. *Conservation Letters*, *16*(6), e12988.

de Oca Munguia, O. M., Pannell, D. J., Llewellyn, R., & Stahlmann-Brown, P. (2021). Adoption pathway analysis: Representing the dynamics and diversity of adoption for agricultural practices. *Agricultural Systems*, *191*, 103173. https://doi.org/10.1016/j.agsy.2021.103173

Pannell, D. J., Marshall, G. R., Barr, N., Curtis, A., Vanclay, F., & Wilkinson, R. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian journal of experimental agriculture*, *46*(11), 1407-1424. https://doi.org/10.1071/EA5037

Table 3. Summary of regional survey results

Region	Mackay Whitsunday	Lower Herbert	Lower Burdekin
No. of Major Grant projects	72	94	33
No. of grower surveys[9]	55, all participated in the survey	50 (49% opted out of the survey)	32, all participated in the survey
(C)Most popular items	GPS rate controller, herbicide equipment	GPS rate controller, stool splitter and fertiliser boxes	Irrigation equipment, Stoolzippas, precision ag. equipment
(D) Type of improvements	Fertiliser and herbicide management	All fertiliser management	Irrigation and fertiliser management
Q1. Age distribution	A wider spread of ages and more younger growers (only 50% aged 55 years or older)	Mostly older growers (64% 55 years or older)	A wider spread of ages (from 35 to over 65 years old) and more younger growers (only 50% aged 55 years or older)
Q2. Previous participation in water quality programs	Most growers had participated in a water quality program previously (63%) but 37% had not	Most growers had not previously participated (84%) in a water quality program.	Most growers had participated in a water quality program previously (66%) but 25% were growers who had not (9% were not sure if they had or not)
Q2A. Impact of the grant on participation	Major grants had a strong influence on participation (56% reported a lot of influence, 30% a bit of influence). Results consistent across growers who were new to water quality projects and more experienced participants	Question not asked.	
Q3. Source of information about the Major Grants Project.	Direct from delivery providers (78%)	Direct from CANEGROWERS Herbert River (88%)	Direct from delivery providers (81%)

[9] As of 19 June 2024.

Region	Mackay Whitsunday	Lower Herbert	Lower Burdekin
Q4. Ease of the grant application process	94% of growers found it easy or very easy	84% of growers found it easy or very easy	88% of growers found it easy or very easy
Q4 & 5. Comments and suggestions	Consistent across regions – the process was easy, help was appreciated, keep it simple, more communications. Growers in the Lower Burdekin also suggested more demonstration sites		
Q6. Impact of the grant	Consistent across regions, about 30% of grower say they would not have adopted that practice without the grant		
	33% of growers report they would have adopted in the next 3 years (this category was dominated by growers who had previously participated in water quality programs). 11% reported they would have adopted in the future (> 3 years' time). 26% said the grant allowed them to adopt at a larger scale.	36% of growers report they would have adopted in the next 3 years, and 28% reported they would have adopted in the future (> 3 years' time). 12% said the grant allowed them to adopt at a larger scale.	Only 16% said they would have adopted in the next 3 years. About a third of growers (31%) report they would have adopted in the future (> 3 years' time). 25% said the grant allowed them to adopt at a larger scale.
Q7. Expected ease of maintaining the practice	92% said easy or very easy to maintain the practice.	100% said it will be easy or very easy to maintain the practice.	85% said easy or very easy. 16% said it was neither easy nor difficult.
	Consistent across regions, no growers expected it to be difficult to maintain the practice.		

3.3 Achievements

The main achievements of the three regional Major Grants Projects are summarised in Table 4 below. The number and average size of grants varied between regions (and between rounds and types of projects within each region). The Lower Burdekin had a distinctive split between large, automated irrigation projects and smaller nutrient and water use efficiency projects. Mackay Whitsunday provided grants for both nutrient and pesticide management, and the pesticide projects were generally larger in value than the nutrient management projects. Lower Herbert grants were more consistent in size than grants in the other regions.

Table 4. Summary of regional achievements

Region	Mackay Whitsunday	Lower Herbert	Lower Burdekin
Number of projects	72 projects	94 projects	33 projects
Total grants disbursed	$1,838,804	$1,691,270	$1,019,810
Grower co-contributions	$3,511,655	$1,966,116	$1,292,727
Targets	DIN Target:2,600 kg pa DIN Achieved 3,480 kg pa DIN Pesticides Target: 732,500 RU pa Achieved 1,768,219 RU pa	DIN Target: 6,375 kg pa DIN Achieved:12,038 kg pa DIN	DIN Target: 4,800 kg pa DIN Achieved: 5,588 kg pa DIN
Overall cost effectiveness	DIN Target: $283 / kg DIN Achieved: $230 / kg DIN Pesticides Target: $2.10 / RU Achieved: $0.96 / RU	DIN Target: $329 / kg DIN Achieved: $141 / kg DIN	DIN Target: $234 / kg DIN Achieved: $268 / kg DIN DIN
On-farm cost-effectiveness benchmarks	n/a	n/a	Irrigation projects Benchmark: $312 / kg DIN Achieved: $232 / kg DIN Nutrient projects Benchmark: $131 / kg DIN Achieved: $115 / kg DIN

The Mackay Whitsunday Major Grants Project met water quality and cost-effectiveness targets (acknowledging issues with tracking water quality benefits, detailed in Section 4). The Lower Herbert Major Grants Project has nearly doubled its DIN target and easily exceeded cost-effectiveness benchmarks. The Lower Burdekin Major Grants Project exceeded its DIN target but not the overall cost-effectiveness target, although it did meet on-farm cost-effectiveness benchmarks for both irrigation and nutrient and water use efficiency projects.

3.4 Key Evaluation questions

What practices were enabled by the Major Grants Projects?

In general, the Major Grants Projects supported the purchase or modification of machinery such as high-rise tractors, attachments (e.g., fertiliser boxes, spray rigs, stoolzippas), nutrient and water monitoring devices, precision agriculture components (GPS and automated irrigation systems).

To what extent can the Major Grants Projects demonstrate additionality?

Additionality is a measure of what behavioural changes occur because of an intervention, in addition to what would have happened otherwise. In this case, we are assessing the impact of the grant program, so we are interested in what behavioural changes were enabled by the grants that would not have happened without the grants i.e., with extension alone. Grants do not directly motivate growers to change behaviour, but may allow growers to overcome financial barriers to adoption of a practice that they believe offers benefits to their farming system (financial, labour, productivity, profitability and environmental benefits). Adoption decisions are also influenced by other factors such as financial capacity, knowledge, skills and labour, as well as advice from extension services, peers, family and others (see Coggan et al., 2021[10], Dean et al., 2023[11], Eberhard et al., 2021[12]). In short, grants can enable, or bring forward in time, grower's decisions to adopt.

Grower surveys asked about the influence of the major grant on adoption. Noting that these self-reported measures are a weak measure of additionality, the results suggest that between 1/4 and 1/3 of growers would not have adopted that practice without the grant

[10] Coggan, A., Thorburn, P., Fielke, S., Hay, R., & Smart, J. C. R. (2021). Motivators and barriers to adoption of Improved Land Management Practices. A focus on practice change for water quality improvement in Great Barrier Reef catchments. *Marine Pollution Bulletin*, *170*, 112628. https://doi.org/10.1016/j.marpolbul.2021.112628

[11] Dean, A. J., Eberhard, R., Baresi, U., Coggan, A., Deane, F., Hamman, E., Helmstedt, K. J., Loechel, B., Jarvis, D., & Mayfield, H. (2023). Scrutinizing the impact of policy instruments on adoption of agricultural conservation practices using Bayesian expert models. *Conservation Letters*, *16*(6), e12988. https://doi.org/10.1111/conl.12988

[12] Eberhard, R., Coggan, A., Jarvis, D., Hamman, E., Taylor, B., Baresi, U., Vella, K., Dean, A.J., Deane, F., Helmstedt, K., Mayfield, H. (2021). Understanding the effectiveness of policy instruments to encourage adoption of farming practices to improve water quality for the Great Barrier Reef. *Marine Pollution Bulletin*, *172*, 112793. https://doi.org/10.1016/j.marpolbul.2021.112793

(suggesting high additionality) and about a 1/3 of growers invested 1-3 years earlier than they would have otherwise (suggesting low additionality for these growers – they would have adopted without the grant). The balance said that the grant allowed them to adopt a larger scale e.g. larger equipment, or that they would have done in sometime in the future (beyond 3 years) (also suggesting high additionality). Stronger measures of additionality could apply longitudinal studies which recognise the dynamic and evolving nature of adoption pathways (see Read et al., 2024[13] and de Oca Mungia et al., 2021[14]).

To what extent are practices likely to be enduring?

Historical grant programs in the GBR have had significant dis-adoption, likely due to poorly designed programs and overly optimistic reporting (see Dench, 2024[15] for a discussion of the need for sustained extension support and practice change reporting challenges). The Major Grants Projects were designed to address the risk of dis-adoption in three ways:

- By requiring a cash co-investment from growers of at least 50%
- By ensuring that growers were receiving ongoing extension support (up to four years)
- By conducting independent verifications of a sample of on-farm projects[15].

Across all regions, program managers and delivery providers were confident that the practices adopted with support of the Major Grants Projects will be enduring, because of the levels of co-investment and sustained extension support. Growers were also confident that maintaining the practice would be easy or very easy (no growers reported that they expected it to be difficult). These results suggest that dis-adoption should be lower than seen in previous water quality grant programs.

What were the additional water quality benefits (projected/modelled DIN and pesticide reductions, and pesticide toxicity improvements) enabled through the grants?

Water quality benefits are detailed in the achievements section above, with additional detail provided in the regional sections following. Overall, the Major Grants Projects achieved a reduction of 21,106 kg pa DIN, and 1,768,219 pesticide RUs pa (in addition to what extension programs were achieving).

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[13] Read, D. J., Blair, E., & Wainger, L. (2024). Effective Engagement Techniques Across the Agricultural Conservation Practice Adoption Process. *Environmental management (New York)*, *74*(6), 1173-1189. https://doi.org/10.1007/s00267-024-02043-8

[14] de Oca Munguia, O. M., Pannell, D. J., Llewellyn, R., & Stahlmann-Brown, P. (2021). Adoption pathway analysis: Representing the dynamics and diversity of adoption for agricultural practices. *Agricultural Systems*, *191*, 103173. https://doi.org/10.1016/j.agsy.2021.103173

[15] Dench, C. (2024). *Sugarcane Program - Learnings and Recommendations Report* (Reef Trust Partnership Water Quality Program). https://barrierreef.org/uploads/Sugarcane-Programs-Learnings-and-Recommendations-Report-2024.pdf

What was the value of the Major Grants Projects being administered centrally (e.g., by Reef Catchments Ltd., CANEGROWERS Herbert River or NQ Dry Tropics) as opposed to the grants being managed by extension delivery providers directly as part of their projects?

The Major Grants Projects adopted a model of grant delivery that incorporated a centralised regional administrator, supported by a program steering committee that had oversight of the whole Regional Water Quality Program. The value proposition of the centralised regional administration rests on the following:

- Design and delivery of the Major Grants Projects required good local knowledge and networks pertinent to cane growing, grower behaviour and extension services, and program management capacity to play a regional leadership role. This was needed for the initial grant proposal, and even more so when implementation challenges required changes to programs.
- Administrative tasks that required regional oversight included:
    - Grant criteria and guidelines
    - Grant assessment process
    - Communication with delivery providers and growers
    - Regional coordination of the delivery network
    - Aggregation and reporting of regional activities and outcomes
    - Regional monitoring and evaluation activities including collecting P2R and major grant grower surveys and facilitating validation of a sample of projects
    - Public communications.
- The imposition of a new system of contractually embedded water quality targets had significant implementation challenges, including how grants were delivered, and how DIN accounting was managed between projects and between delivery providers. The regional administrators played a critical role in adjudicating and resolving these issues, including liaison with GBRF when required.

What is the cost-effectiveness of the Major Grants Projects?

The cost-effectiveness results are detailed in the achievements section above, with additional detail provided in the regional sections following.

What unintended outcomes (positive and negative) have resulted from the Major Grants Projects? (if any)?

Unintended or ancillary outcomes for the Major Grants Projects include:

- Additional water quality benefits, e.g. DIN projects that also delivered soil savings.
- Additional Smartcane BMP accreditations (c. 50) in the Lower Herbert region.
- The refinement and application of additional tools to assess water quality benefits – the i-RAT in the Lower Burdekin and the PDST in Mackay Whitsunday. These complement the P2R Projector tool and improved assessment capability.
- The collection of benchmarking and monitoring data for practice change – particularly for the automated irrigation projects in the Lower Burdekin.
- The investment of over $11M (grants and grower co-contributions) in predominantly local supply and manufacture of agricultural equipment.

- The investment of c. $1.5M in grant delivery and $4.5M in grants to growers.

3.5 Summary

The Major Grants Projects applied a new approach to supporting practice change in three cane growing areas. The grants were designed to complement extension projects, required at least 50% grower cash co-contribution and were assessed on their water quality benefits. There were several challenges to the implementation of the new approach and grant administrators worked with GBRF and other delivery providers to adjust programs in response. All programs met their water quality targets and mostly met cost-effectiveness benchmarks. Some of the accounting approaches limited the ability to attribute water quality savings to the grants, particularly in the Mackay Whitsunday region. Feedback from growers was very positive, and almost all growers found the process easy or very easy (with delivery provider support). Despite some the implementation challenges program managers and delivery providers are proud of what the Major Grants Projects achieved.

4. Mackay Whitsunday

4.1 Mackay Whitsunday Regional Water Quality Program

Objectives

The Mackay Whitsunday Water Quality Program sought to achieve an enduring reduction in the long-term end-catchment loads of DIN (26,000 kg pa) and pesticides (2,960,100 Risk Units (RU) pa, initially this was articulated as 215 kg pa). Targets were aligned with the catchment priorities in the Reef 2050 Water Quality Improvement Plan 2017-2022[16] and investments were informed by modelling intervention scenarios (Alluvium, 2019[17]).

Governance arrangements

The governance arrangements for the Mackay Whitsunday Regional Water Quality Program are shown in Figure 3 below. In this region, the Program Manager and Regional Partnerships Coordinator were contracted to an independent consultant and Reef Catchments Ltd respectively, with the latter also delivering the Major Grants Project.

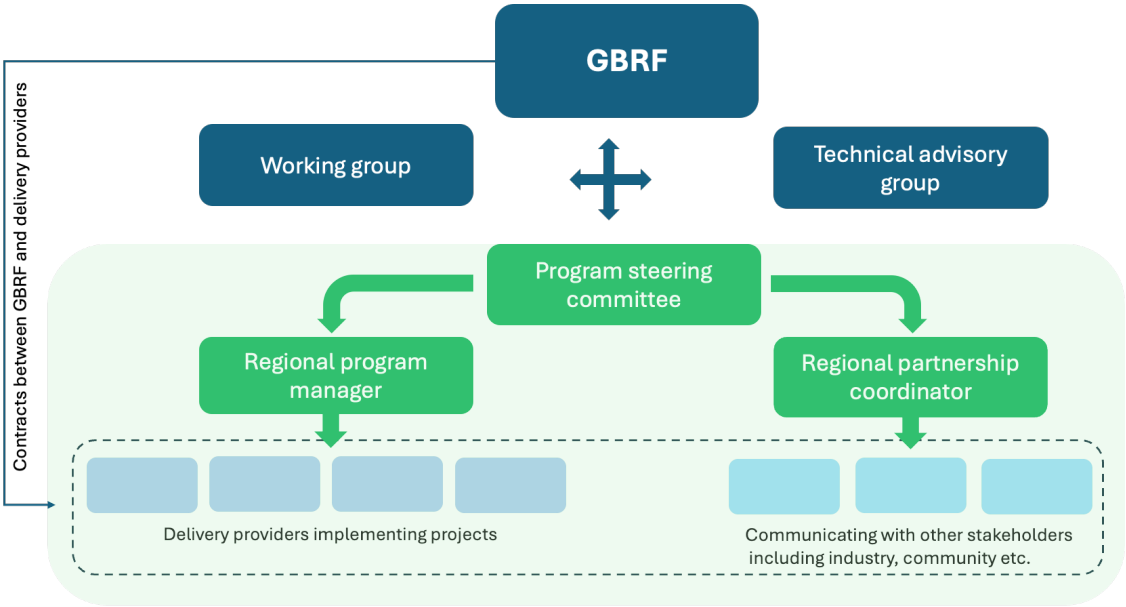

Figure 3. Governance arrangements for the Mackay Whitsunday Regional Water Quality Program

[16] DIN and pesticide targets for the Pioneer, Plane Creek, Proserpine and O'Connell catchments in the Queensland and Australian Governments (2018) Reef 2050 Water Quality Improvement Plan 2017-2022 are a 70% reduction in end of catchment DIN loads, and concentrations of pesticides sufficient to protect 99% of aquatic species, by 2025.

[17] Alluvium. (2019). Effective and Efficient Pathways for Investment in Improved Water Quality in the Great Barrier Reef: Final Report. A report for the Great Barrier Reef Foundation, Brisbane. https://barrierreef.org/uploads/Alluvium-2019-Effective-and-Efficient-Pathways-for-Investment-in-Improved-Water-Quality-in-the-GBR-Web-1.pdf

Projects

The Regional Water Quality Program resourced eight delivery providers to provide complementary services to improve sugarcane management practices (Table 5).

Table 5. Mackay Whitsunday Regional Water Quality Program[18]

Project	Delivery provider	Focus	DIN target	Pesticide target
Major Grants	Reef Catchments Ltd.	Incentives to overcome financial barriers	2,600 kg pa [19]	732,504 RU pa[19]
Project Catalyst	Catchment Solutions	Improving nutrient management practices and field trials	7,500 kg pa	
Irrigation	CANEGROWERS Mackay	Improving irrigation scheduling for nutrient efficiency	2,300 kg pa	
Bluewater Project 2	Farmacist	Improving pesticide management practices		2,900,000 RU pa
Precision Agriculture	Farmacist	Precision agriculture for nutrient and pesticide management	10,700 kg pa	
Local Area Nutrient Datahub	Liquaforce	Precision agriculture for nutrient management	3,200 kg pa	
Nutrient Management and Agtrix	MAPS	Improving nutrient management practices	5,700 kg pa	
Cane to Creek	Sugar Research Australia (SRA)	Demonstration trials/sites	11,100 kg pa	86 kg pa
Reef Credits	Green Collar	Reducing fertiliser application	n/a[20]	n/a[10]

4.2 Mackay Whitsunday Major Grants Project

Within the Mackay Whitsunday Regional Water Quality Program, the Major Grants Project provided growers with financial assistance to implement additional improvements in nutrient management practices.

Project targets

The Mackay Whitsunday Major Grant Project had a budget of $2.5 M. The key pollutants targeted were DIN and pesticides. Initial targets were based on a budget allocation of 68%

[18] Source: Mackay Whitsunday Regional Plan and GBRF

[19] The initial targets for the Mackay Whitsunday Major Grants Project were 4.5T DIN/pa and 77 kg pesticides. These were amended to accommodate increased interest in pesticide projects and the pesticide units changed from kg to Risk Units (RU)

[20] as per credits generated

to DIN projects and 32% to pesticide projects. Targets were revised, however, to accommodate a greater interest in pesticide projects (the nominal budget allocation between pesticide and DIN projects was reversed, to 68% for pesticide projects and 32% for DIN projects). The units for pesticide targets were also converted to RUs which are a measure of pesticide toxicity calculated by the PDST. After these adjustments the DIN target was 2,600 kg pa, and the pesticide target was 732,500 RU pa (Table 6).

Table 6. Mackay Whitsunday Major Grants Project targets

Mackay Whitsunday Major Grants Project	**Revised targets**[21]
Water quality target (DIN)	2,600 kg pa DIN
Overall cost-effectiveness target (DIN)	$283 / kg DIN
Water quality target (pesticides)	732,500 RU pa
Overall cost-effectiveness target (pesticides)	$2.10 / RU

Delivery arrangements

Mackay Whitsunday was the first of three regions to implement a Major Grants Project and had many delivery providers to work with (see Table 5). Consequently, Reef Catchments Ltd. made a series of changes to improve uptake (these are described in the following section). Grant guidelines were developed (and revised) to provide information to delivery providers and growers, including key dates, eligibility requirements and assessment criteria.

Reef Catchments Ltd. ran three grant rounds. Delivery providers worked with growers to prepare grant applications, which were then assessed by Reef Catchments Ltd. The process was slightly different for growers already working with delivery providers as part of the regional water quality program, and BMP-accredited growers who were not working with delivery providers. In the latter case, once initial checks were completed, Reef Catchments would refer the grower to local extension providers[22] to develop the application and provide extension support.

Applications were assessed on cost-effectiveness, water quality improvements and the likelihood of success. The first grant round assessed all individual projects against the cost-effectiveness benchmarks. Later, an "overs and unders" approach was adopted where delivery providers could bundle grower applications into a batch, with a pooled water quality outcome that demonstrates overall cost-effectiveness.

Growers were required to contribute at least 50% of on-farm project cost and were given 12 months to complete their project. All growers received relevant agronomic support. Grants were offered as split payments (50% on contracting, 50% on acquittal). At acquittal growers provided evidence such as receipts and photos, were inspected by Reef Catchments Ltd. and completed P2R and major grant grower surveys.

[21] Source: GBRF

[22] Mackay Area Productivity Services (MAPS), Plane Creek Productivity Services Ltd. (PCPSL) or Farmacist

Progress towards end of catchment targets was regularly reviewed with GBRF using the dashboard system (i.e., projected reduction by P2R Projector Tool or PDST).

4.1 Implementation

Grant rounds

The Major Grants Project commenced after other regional water quality extension projects had started. Delivery providers were somewhat reluctant to take on the additional workload and delivery targets associated with the Major Grants Project. The first grant round was slow to get going, and meeting cost-effectiveness targets for individual grant proposals was challenging[23].

Various changes to the program were made to encourage participation (Table 7). The key changes were the increase and then removal of the grant cap, the opening of the grant to Smartcane BMP accredited growers (not just those growers already engaged with regional extension projects), and the development of the DIN and pesticide accounting system that allowed 'surplus' to be transferred between on-farm projects. Eligible catchments were expanded from Plane Creek and Pioneer to include O'Connell and Proserpine catchments.

The PDST allowed pesticide projects to be assessed for the grant funding. Pesticides projects were late to commence for this reason but proved popular with growers. The balance of investments (and targets) between DIN and pesticides were adjusted accordingly.

Table 7. Summary of changes to the Mackay Whitsunday Major Grants Project[24]

Delivery model	Catchments	Cap	DIN savings target	Pesticide savings targets	Eligibility	Accounting
#1 (discrete funding round)	Plane Creek, Pioneer	$20,000	4,500 kg pa	77 kg pa	Available to growers working with regional WQ program delivery providers	Individual projects assessed against cost-effectiveness benchmarks.
#2 (ongoing funding)	Plane Creek, Pioneer	$30,000	4,500 kg pa	303,600 RU pa	Available to growers working with regional WQ program delivery providers and opened to other BMP accredited growers	Collective (batch) assessment against cost-effectiveness benchmarks.

[23] Source: Interviews with regional manager and regional coordinator

[24] Source: GBRF

Delivery model	Catchments	Cap	DIN savings target	Pesticide savings targets	Eligibility	Accounting
#3 (ongoing funding)	Plane Creek, Pioneer, O'Connell and Proserpine	No cap[25]	2,600 kg pa	732,500 RU pa	As above	As above

Challenges

The Mackay Whitsunday Major Grants Project started after other regional delivery providers had been contracted to deliver extension projects. Delivery providers were not enthusiastic about supporting the major grants, which were seen as providing additional work and contractual obligations. One provider declined to participate; some didn't promote the scheme. Most of the major grants in this region were delivered by Farmacist and MAPS.

Reef Catchments Ltd. did not have the inhouse capacity to deliver the major grants themselves[26], and struggled with staff turnover through the life of the project. Delivery providers were critical of the value of Reef Catchments Ltd as a program manager in this instance[27]. Delivery providers found the frequent changes to the grant guidelines and DIN accounting frustrating and confusing. Several delivery providers also commented about perceived equity issues arising from different arrangements for some delivery providers[27]. The independent regional manager proved a valuable addition to help the program work effectively[27]. All delivery providers agreed that the program was working well by the end but would have worked better if there was better communication and the rules were clear at the outset.

Changes to the rules, particularly the increase and then removal of the cap amount was also perceived to be inequitable to growers. For example, a grower may have accepted a grant in the first round when a $20,000 cap was in place but would have received a larger grant if applying later in the program. Some growers accessed the Major Grants Project several times.

The P2R Projector Tool has significant limitations when applied to assess the water quality benefits of practice changes at this scale. Program managers, delivery providers and growers have low confidence in the P2R estimates and were frustrated at its inability to assess the benefits of some practices such change in pesticide risk associated with a change in chemical selection[28]. Initially this made it difficult to satisfy grant criteria for funding pesticide projects. After discussion with GBRF, the PDST tool (developed by Farmacist and the University of Queensland) was used to estimate pesticide benefits. Some of the earlier

[25] While there was no cap, Reef Catchments Ltd. developed a 'sliding scale' system of calculating grant amounts. In effect it meant that as the project got larger the proportion of cost covered by the grant decreased i.e., diminishing grant investment (source: Project manager interview)

[26] Source: Regional manager interview

[27] Source: Delivery provider interviews

[28] Source: Draft interim final report.

applications were revisited and found to be eligible for grant funding. Investment in pesticide projects was delayed as a result (nearly 2 years into the 4-year program) but quickly ramped up after that point[29].

A system of 'batching' several projects together and assessing the collective benefits against cost-effectiveness targets smoothed the process for approving projects. This approach was developed to overcome the challenges of assessing individual grant projects against cost-effectiveness targets, including the limitations of the P2R Projector Tool. and difficulty in separating the water quality benefits of grants and their linked extension projects. While this approach was effective at enabling grant projects to proceed, it compromised the ability to accurately tracking of the benefits of the major grants (additional to extension services), and this was confounded by differences in how delivery providers reported major grants through the P2R system.

DIN savings were also shared between Reef Catchments Ltd. and delivery providers e.g., Farmacist agreed to allocate 70% of the proposed reductions from grants projects to Reef Catchments Ltd. Delivery providers found these arrangements confusing and frustrating[30].

Grower feedback

Surveys were used to elicit grower feedback on the Major Grants Project (full results are provided in Appendix A). Most (67%) of the Mackay Whitsunday growers had previously participated in a water quality program, but 37% were 'first timers'. Almost all growers (94%) found the grant application process easy or very easy (none found it difficult). About 30% of growers said they would not have adopted the practice without the grant, and this result was consistent across regions. Another third (33%) said they would have adopted in the next 3 years, and these growers were mostly those with prior experience of water quality programs. Only 11% said they would have adopted the practice sometime in the future (but probably not in the next 3 years) and 26% said the grant allowed them to implement the practice at a larger scale. Almost all (92%) growers expected it to be easy or very easy to maintain the practice. Growers appreciated the help provided by delivery providers and suggested keeping the grant process simple and improving communications for future grant programs.

4.2 Achievements

Number and type of projects

The Mackay Whitsunday Major Grant Program supported 72 projects (36 DIN projects and 36 pesticide projects). Stool splitters, double disc openers, liquid fertiliser applicators, pesticide applicators, high rise spray rig tractors and boom improvements were popular items for the Major Grants Project.

[29] Source: Interviews with delivery providers, regional coordinator and regional manager.

[30] Source: Delivery provider interviews

Grant costs and co-contributions

The Mackay Whitsunday Major Grants Project went through three iterations of criteria (Table 7). Initially grants were capped at $20,000, which was raised to $30,000, then the cap was removed altogether and replaced with a sliding scale. Most of the grants were less than $30,000, and half were less than $20,000. Some of the later pesticide projects received quite substantial grant amounts (five grants were $70,000 or larger, with the largest being for $91,450) (Table 8) and these were matched by very large grower co-contributions (nine co-contributions were over $100,000 and the largest was $440,000). Overall, proportionally more was invested in pesticide projects and on average the pesticide grants (and grower co-contributions) were larger than DIN projects.

Table 8. Financial details of Major Grants (Mackay Whitsunday)[31]

Number and type of projects	Grant characteristics	Grant amount	Grower co-contribution
DIN projects (36 projects)	Range (smallest – largest)	$5,455- $45,000	$5,455- $165,000
	Average	$21,482	$26,649
	Total	**$773,362**	**$959,350**
Pesticide projects (36 projects)	Range (smallest – largest)	$2,380- $91,450	$2,380- $440,000
	Average	$29,596	$70,897
	Total	**$1,045,941**	**$2,532,804**
All projects (72 projects)	Range (smallest – largest)	$2,380- $91,450	$2,380- $440,000
	Average	$25,539	$48,773
	Total	**$1,838,804**	**$3,511,655**

Water quality benefits

Clarifying the water quality benefits of the Mackay Whitsunday Major Grants Project is complex because of differences in accounting practices between delivery providers and changes over time. Analytical challenges have included:

- The use of two systems of on-farm project identifying codes, with overlapping terminology.
- Some providers used a single P2R practice change assessment for both extension and major grant elements, while other delivery providers separated extension and grant entries.
- As a result, individual grants projects (separate from practice changes recorded by extension projects) were assessed (by the P2R Projector Tool) as having no benefits. These projects were approved based on their contribution to implementation of practice changes recorded against extension projects.

[31] Source: Project acquittals

- To meet cost-effectiveness benchmarks, a system of assessing batched applications where “surplus” DIN or pesticide savings were shared across projects to meet cost-effectiveness targets.
- At the time of writing this report, final project reporting and acquittals were not complete.

As a result, it is not possible to get an accurate assessment of water quality outcomes from the Major Grants Project through interrogation of the P2R datasets. The regional manager and coordinator have provided useful clarifications to assist with analysis. The best estimates of water quality benefits (sourced from the draft interim final project report) indicate 3,480 kg pa DIN and 1,768,219 RU pa. These could not be verified from P2R data for the reasons outlined above.

Cost-effectiveness of DIN and pesticide savings

Overall cost-effectiveness was calculated as the total project cost ($2.5M) allocated 32% to DIN and 68% to pesticide savings. Acknowledging uncertainty arising from the challenges outlined above, the Mackay Whitsunday Major Grants Project achieved an overall cost-effectiveness of $230/kg DIN (exceeding the target of $283/kg DIN) and $0.96/RU (far exceeding the target of $2.10/RU) (Table 9).

Table 9. Water quality and cost-effectiveness achievements (Mackay Whitsunday)

Parameter	Measure	Targets	Achievements
DIN	Load reduction	2,600 kg pa	3,480 kg pa
	Overall cost-effectiveness	$283 / kg	$230 / kg
Pesticides	Reduced pesticide risk	732,500 RU pa	1,768,219 RU pa
	Overall cost-effectiveness	$2.10 / RU	$0.96 / RU

Additional benefits

Most machinery purchased through with the support of Major Grants Project was purchased locally. This was a c. $5.3M investment (grant and grower co-contributions) through local suppliers. The overall investment in local service delivery and supply chains supports the development and maintenance of local capacity to work with growers and any future water quality programs.

The application of the PDST to assess pesticide projects was a significant contribution to this project and enabled investment in pesticide management practices. The tool provides a useful complement to P2R and other decision support systems with potential for wider application.

4.3 Summary

The Mackay Whitsunday Major Grants Project successfully delivered 72 on-farm grants for DIN and pesticide savings across the region. This region pioneered the major grants approach, and the implementation of such novel arrangements was challenging, in particular, processes to assess and report the pollutant savings from individual grant projects. The Major Grants Project underwent a series of significant changes to improve participation. While these changes encouraged growers to apply and enabled grants to be disbursed, the changes were a source of confusion and frustration amongst delivery providers and created inequities for growers who engaged with the program at different times.

Accounting for DIN and pesticides was particularly problematic in this region, where it was not possible to disentangle water quality savings of the grant projects from associated extension projects. The aim of the grants (in this context) was to overcome financial barriers to the purchase of technology and equipment to sustain improved practices facilitated by extension projects. The use of surpluses and collective assessment enabled the project to meet water quality targets and cost-effectiveness benchmarks.

Growers were very positive about their experience of the Major Grants Project and found the grant process easy or very easy.

The key learnings apparent in the Mackay Whitsunday Major Grants Project include the following:

- The benefits of commissioning all water quality projects at the same time, so cross-dependencies can be clarified and incorporated into project contracts if required.
- Incorporating DIN targets in delivery provider contracts provides clear performance measures but accounting processes (particularly between projects) need to be resolved early.
- Substantial changes to the program's guidelines improved participation but were also confusing to delivery providers and inequitable to growers.
- The adoption of flexible accounting rules that applied cost-effectiveness criteria across projects allowed projects to proceed but masked cost-effectiveness data for individual projects and therefore overall transparency and accountability.
- The P2R Projector Tool is constrained in its ability to assess the water quality benefits of pesticide projects. In Mackay Whitsunday the application of the PDST allowed pesticide projects to be supported by the grant program.

5. Lower Herbert

5.1 Lower Herbert Regional Water Quality Program

Objectives

The Lower Herbert Water Quality Program was designed to achieve an enduring reduction in the long-term end-catchment DIN (140,000 kg pa) from the Lower Herbert catchment (aligned with the Herbert catchment targets in the Reef 2050 Water Quality Improvement Plan 2017-2022[32]) and investments were informed by modelling intervention scenarios (Alluvium, 2019[33]).

Governance arrangements

The governance arrangements for the Lower Herbert Regional Water Quality Program are shown in Figure 4 below. CANEGROWERS Herbert River was contracted to deliver the Major Grants Project and the Regional Partnership Coordinator. The Lower Herbert project also established a Steering Committee to guide project planning and implementation and assess grant applications. The Committee included representatives from the Queensland Government Department of Agriculture and Fisheries (DAF) (agricultural economics), GBRF (Program Manager Water Quality), CANEGROWERS Herbert River (industry representative), Sugar Research Australia (agronomist), and grower representatives.

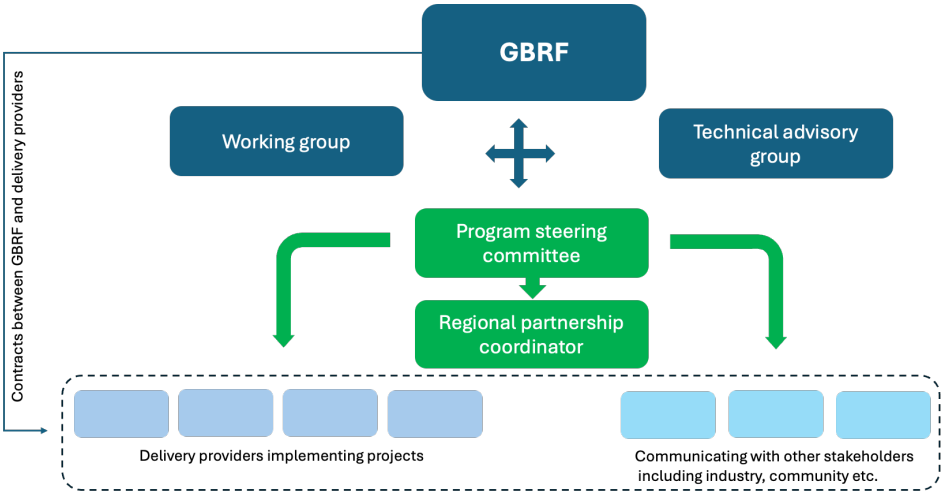

Figure 4. Governance arrangements for the Lower Herbert Regional Water Quality Program

[32] The Herbert River catchment targets in the Queensland and Australian Governments (2018) Reef 2050 Water Quality Improvement Plan 2017-2022 are a 70% DIN load reduction (640 tonnes/year) at the end of catchment by 2025, and 30% reductions in fine sediment, particulate phosphorous and particulate nitrogen, as well as concentrations of pesticides sufficient to protect 99% of aquatic species

[33] Alluvium. (2019). Effective and Efficient Pathways for Investment in Improved Water Quality in the Great Barrier Reef: Final Report. A report for the Great Barrier Reef Foundation, Brisbane. https://barrierreef.org/uploads/Alluvium-2019-Effective-and-Efficient-Pathways-for-Investment-in-Improved-Water-Quality-in-the-GBR-Web-1.pdf

Projects

The Regional Water Quality Program comprised six projects to improve water quality in the region (Table 10).

Table 10. Lower Herbert Regional Water Quality Program projects

Project	Delivery provider	Focus	DIN target[34]
Major Grants Project	CANEGROWERS Herbert River	Incentives to overcome financial barriers	6,375 kg pa
Modernising on farm mill mud application	Agro Group	Precision mill mud application	63,900 kg pa
Project Catalyst Broader Adoption	Catchment Solutions	Project Catalyst expansion	4,200 kg pa
Project CaNE (Crop and Nutrient Efficiency)	HCPSL	Nutrient management planning and local water quality monitoring	62,500 kg pa
LAND (Local Area Nutrient Datahub)	Liquaforce	LANDHub training and access, nutrient management planning	6,000 kg pa
Reef Credits	Green Collar	Land management and wetland restoration via credits	n/a[35]

5.2 Lower Herbert Major Grants Project

Within the Lower Herbert Regional Water Quality Program, the Major Grants Project provided growers with financial assistance to implement additional improvements in nutrient management practices.

Project targets

The Lower Herbert Major Grant Project had a budget of $2.1M. The key pollutant targeted was DIN (6,375 kg pa DIN) and a cost effectiveness target of $329/kg (total project cost divided by DIN reduction target) (Table 11).

Table 11. Lower Herbert Major Grants Project targets

Major Grants Project	Lower Herbert
Water quality target	DIN: 6,375 kg pa
Overall cost-effectiveness target (DIN) [36]	$329 / kg DIN

[34] Source: GBRF

[35] as per credits generated

[36] Source: Lower Herbert Implementation Guidelines

Delivery arrangements

Delivery arrangements for the Lower Herbert Major Grants Project are summarised in Table 12 below (and further detail can be found in project documents). Grant guidelines were developed to provide information to delivery providers and growers, including key dates, eligibility requirements and assessment criteria.

Applications were prepared by the delivery providers or CANEGROWERS Herbert River (working with growers) and assessed by Steering Committee who reviewed de-identified grant applications, and ranked projects based on expected DIN reduction and cost-effectiveness.

Grants were capped at $25,000 and growers were required to co-contribute at least 50% of project cash costs. Growers were required to demonstrate Smartcane BMP accreditation before the completion of their project. There was no requirement for growers to be a member of CANEGROWERS Herbert River or to be engaged with other regional water quality projects.

Table 12. Lower Herbert Major Grants Project delivery arrangements

Characteristics	**Lower Herbert**
Number of grant rounds	3
Grant cap	$25,000
Co-contribution required	≥50% cash contribution
Grant paid as	Split payment: 50% of grant on contracting, 50% on acquittal
Open to	All growers who hold or undertake to achieve Smartcane BMP accreditation
DIN accounting between projects and between delivery providers.	Some batching of DIN surplus DIN savings stayed with delivery providers

Growers were given 12-18 months to complete their project. Delivery providers assisted growers with agronomic support. Grant payments were split, with 50% upon contracting, and the balance at project completion, when growers provided evidence such as receipts and photos and met other requirements including P2R benchmarking and Smartcane BMP accreditation. CANEGROWERS Herbert River assisted growers to achieve BMP accreditation.

CANEGROWERS Herbert River was responsible for managing the individual grower contracts for the major grants, including P2R reporting requirements. The DIN reduction accorded to each grant project were allocated to the delivery provider who first engaged the grower.

5.3 Implementation

Grant rounds

Three full rounds of grant were conducted, and an additional 'lightning round' to use remaining funds in shortened timeframes at the end of the project. Ninety-four projects were approved by the Steering Committee, who reported several challenges, including:

- Timely flow of proposal documentation to the Committee (DIN reduction estimates linking letters from delivery providers, consent forms etc.)
- Delays to equipment manufacture (labour and supply chain issues)
- Ensuring growers achieved Smartcane BMP accreditation
- Impacts of extended wet season on the final year of the project.

In the first round, contract variations were used to adjust delivery provider DIN targets which created some delays. This was subsequently resolved using a 'linking letter' from delivery providers who then provided the DIN reduction estimates for the grant proposal.

After the final round some unallocated funds ($2,435) were invested (with GBRF's agreement) in improvements to the CANEGROWERS Herbert River nitrogen and phosphorous budgeting tool that supports the BMP process and compliance with regulation.

The program has been extended to February 2025 to allow for manufacturing delays.

Challenges

Like other regions, the Major Grants Project commenced after the other regional water quality projects had commenced. Not all delivery providers agreed to support the Major Grants Project, and those that did were concerned about the additional workload.

All delivery providers had contractual requirements to meet DIN savings targets. There was competition for growers in the early stages, and a tension between delivery providers and the Major Grants Project over the attribution of DIN savings that were supported by both extension services and a major grant. These tensions were relieved when it became apparent that all delivery providers were likely to exceed their DIN targets, and the adoption of a 'linking letter' system. The 'linking letter' stated that the first delivery provider to engage the grower could claim the DIN savings.

Progress reports noted ongoing issues, including delivery providers not providing robust P2R estimates to the Major Grants Project. In contrast, delivery providers reported that there was little communication from the Major Grants Project team back to delivery providers, concerns about the potential for growers to receive inconsistent P2R estimates (from delivery providers and CANEGROWERS Herbert River) and missed opportunities for a more coordinated approach to working with growers. Both delivery providers and CANEGROWERS Herbert River staff noted that the system improved over time and was working well by the end of the project.

Smartcane BMP accreditation was a requirement of the grant contract so growers who were not already accredited were required to complete accreditation. Although CANEGROWERS Herbert River assisted growers, BMP accreditation caused some delays to final grant

payments. There was some pushback from growers that BMP accreditation was a requirement of the grant (growers find the recordkeeping hard to do).

Grower feedback

Interestingly the Lower Herbert growers were less enthusiastic about answering the Major Grant grower surveys than growers in other regions (only half were happy to answer survey questions). The full survey results are provided in Appendix B. Most of the Lower Herbert growers had not previously participated in a water quality program (84%). Most growers (84%) found the grant application process easy or very easy (none found it difficult). About 30% of growers said they would not have adopted the practice without the grant, a third (36%) said they would have adopted in the next 3 years, and a third (28%) said they would have adopted the practice in the future, but probably not in the next 3 years. The balance said the grant allowed them to implement the practice at a larger scale. All growers expected it to be easy or very easy to maintain the practice. Growers appreciated the help provided by CANEGROWERS Herbert River and other delivery providers. Suggestions for improvements including keeping the grant process simple and improving communications.

5.4 Achievements

Number and type of projects

The Lower Herbert Major Grant Program has supported 94 projects.

About 80% of grants were for new machinery, typically rate controllers, often with subsurface application and legume planters. About 20% of the Lower Herbert grants were for modifications – mostly to fertiliser boxes[37].

Grant amounts and co-contributions

Individual grants were capped at $25,000. Details of the grant characteristics are provided in Table 13 below.

Table 13. Financial details of Major Grants (Lower Herbert[38])

Number and type of projects	Grant characteristics	Grant amount	Grower co-contribution
All projects (94 projects)	Range (smallest to largest)	$623[39]- $25,000	$623- $57,050
	Average	$17,803	$20,696
	Total	**$1,691,270**	**$1,966,116**

[37] Source: Project manager and delivery provider interviews

[38] Source: Financial acquittal spreadsheets

[39] This small grant was for modification of existing machinery.

The value of individual grants varied widely. About one third were in the $20-$25,000 range. There were some small grants less than $5,000 for machinery modifications. The average grant size was $17,803. Grower co-contributions ranged from $623 up to $57,050. A minimum 50% co-contribution was required, and most co-contributions were in the 50-60% range of the total on-farm project cost.

Water quality benefits

The Lower Herbert Major Grants Project target was to reduce 6,375 kg pa DIN exported from cane lands. At the time of writing this report the project was still underway and as a result the water quality data was incomplete. According to the most recent progress report, predicted DIN savings are 12,038 kg pa, which is nearly double the target.

DIN savings were highly variable among projects (Table 14). The largest DIN saving recorded was 1,715 kg pa DIN from a collaborative project across two farms[40]. Most projects (c. 90%) delivered less than 400kg pa DIN savings, and nearly half of these were less than 100 kg pa DIN savings. Six projects recorded zero DIN savings nor any other additional water quality benefits. Project staff advised that four of these projects involved growers purchasing equipment that they had previously hired, allowing them to better implement a management practice at the correct time, rather than relying on the availability of hire equipment[40]. All projects were scrutinised by the Steering Committee who considered the P2R estimates but also their judgement of cost effectiveness, DIN saving, water quality benefit, productivity, profitability and legacy in approving projects[40]. GBRF considered it acceptable for a grant project to record no 'additional' DIN if the grant assisted with embedding a practice from a nutrient management plan[41].

The Lower Herbert Major Grants Project has also delivered an estimated 3,573 tonnes soil savings and 281 grams of pesticide savings (Table 14) according to P2R estimates.

Table 14. Water quality benefits of the Major Grants Projects (Lower Herbert)

Number of projects	**characteristics**	**DIN savings (kg pa)**	**Soil savings (tonnes)**	**Pesticide savings (grams)**
All projects (94 projects)	Range (smallest to largest)[42]	0-1,715	0-1,544	0-177
	Average[32,43]	245	73	6
	Total[44]	**12,038**	**3,573**	**281**

[40] Source: Clarification from Project Officer

[41] Source: GBRF interviews

[42] Source: P2R data, only available for 49 of the 94 projects at the time of this report

[43] Average across all projects, including those with 0 water quality benefits

[44] Source: Progress report, July 2024

Cost-effectiveness of DIN savings

Overall cost-effectiveness was calculated as the total project cost (on-farm grants plus project delivery costs) per total DIN savings. The Lower Herbert Major Grants Project achieved an overall cost-effectiveness of $141/kg DIN, which far exceeded the target of $329/kg DIN (Table 15).

Table 15. Water quality and cost-effectiveness achievements (Lower Herbert)[45]

Parameter	Targets	Achievements
Water quality	DIN: 6,375 kg pa	DIN: 12,038 kg pa
Overall cost-effectiveness	$329 / kg DIN	$141 / kg DIN

The cost effectiveness of individual on-farm grants was also examined. On-farm cost effectiveness was calculated as grant cost/DIN savings (excluding project delivery costs). Most grants achieved less than $100/kg DIN, with a long tail of projects that were less cost effective (although only a few were > $400/kg DIN).

Additional benefits

Most machinery was purchased locally. This represents c. $3.6M (grants and grower co-contributions) contributed to the local economy for manufacture and supply of machinery. The overall investment in local service delivery also supports the development and maintenance of local capacity to work with growers and support any future water quality programs.

The Lower Herbert program required growers to hold or achieve Smartcane BMP accreditation as part of the grant requirements. In the Lower Herbert about 40% of the area is BMP accredited[46]. The Major Grants Project will have added about 50 BMP accreditations to the local district (153 Lower Herbert businesses are BMP accredited as of December 2024).[47].

5.1 Summary

The Lower Herbert Major Grants Project is on track to deliver 94 projects. Estimated DIN savings from these projects are 12,038 kg pa, nearly doubling the target of 6,375 kg pa and far surpassing the cost-effectiveness target (achieving $141/kg against a target of $329/kg DIN).

Like other regions there were some issues with how the major grants interacted with other regional water quality projects. CANEGROWERS Herbert River worked through these, and all delivery providers agreed that systems improved over time. Most participating growers

[45] Source: P2R data.

[46] Source: Canegrowers Herbert River figures, cited in the Lower Herbert regional plan.

[47] Source: Program manager interviews and emails

found the grant process easy, even though for many growers this was the first time they had participated in a water quality program.

The key learnings apparent in the Lower Herbert Major Grants Project include the following:

- The benefits of commissioning all water quality projects at the same time, so cross-dependencies can be clarified and incorporated into project contracts if required.
- Incorporating DIN targets in delivery provider contracts provides clear performance measures but accounting processes (particularly between projects) need to be resolved early.
- The P2R projector tool is constrained in its ability to assess the water quality benefits of individual projects.
- The use of an assessment panel helped to facilitate the approval of projects and provide independent oversight.

6. Lower Burdekin

6.1 Lower Burdekin Regional Water Quality Program

Objectives

The Lower Burdekin Regional Water Quality Program was designed to achieve an enduring reduction in the long-term end-catchment DIN (48,000 kg pa) and pesticide loads (600,000 RU pa) from the Lower Burdekin / Haughton catchments (consistent with the Haughton catchment targets in the Reef 2050 Water Quality Improvement Plan 2017-2022[48]) and investments were informed by modelling intervention scenarios (Alluvium, 2019[49]).

Governance arrangements

The governance arrangements for the Lower Burdekin Regional Water Quality Program are shown in Figure 5 following. In this region, NQ Dry Tropics was contracted to deliver the Major Grants Project, as well as the Regional Program Manager and Partnership Coordinator roles (Figure 5).

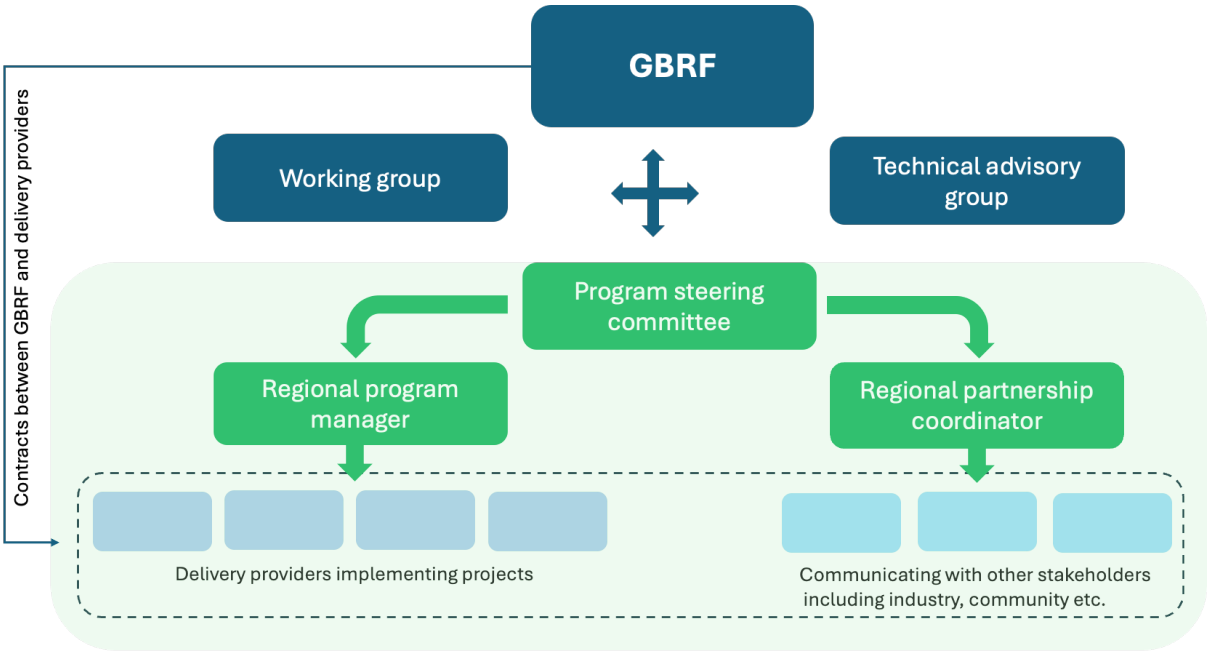

Figure 5. Governance arrangements for the Lower Burdekin Regional Water Quality Program

[48] The Haughton catchment targets in the Queensland and Australian Governments (2018) Reef 2050 Water Quality Improvement Plan 2017-2022 are a 70% DIN load reduction (640 tonnes/year) at the end of catchment by 2025, and concentrations of pesticides sufficient to protect 99% of aquatic species

[49] Alluvium. (2019). Effective and Efficient Pathways for Investment in Improved Water Quality in the Great Barrier Reef: Final Report. A report for the Great Barrier Reef Foundation, Brisbane. https://barrierreef.org/uploads/Alluvium-2019-Effective-and-Efficient-Pathways-for-Investment-in-Improved-Water-Quality-in-the-GBR-Web-1.pdf

Projects

The Regional Water Quality Program comprised four projects to improve water quality in the region (Table 16).

Table 16. Lower Burdekin Regional Water Quality Program projects

Project	Delivery provider	Focus
Major Grants	NQ Dry Tropics, supported by Sugar Research Australia (SRA), Farmacist, AgriTech Solutions and Agltantis	Incentives to overcome financial barriers
Burdekin Irrigation Project (BIP)	SRA[50]	Irrigation management planning
Project Bluewater 2	Farmacist	Pesticide management planning
Precision to Decision	Farmacist	Nutrient management planning

6.2 Lower Burdekin Major Grants Project

Within the Lower Burdekin Regional Water Quality Program, the Major Grants Project provided growers with financial assistance to implement additional improvements in irrigation and nutrient management practices.

Project targets

The Lower Burdekin Major Grant Project had a budget of $1.5M. The key pollutant target was to reduce end-of-catchment loads by 4,800 kg pa DIN, with an overall cost-effectiveness of $234/kg (total project costs divided by total DIN savings) (Table 17). Several on-ground cost-effectiveness benchmarks were also articulated, calculated as the grant cost per DIN savings (excluding project delivery costs).

Table 17. Lower Burdekin Major Grants Project targets

Major Grants Project	Lower Burdekin
Water quality target	4,800 kg pa DIN
Overall cost-effectiveness target (DIN) [51]	$234 / kg DIN
On-ground cost-effectiveness benchmarks (DIN)	$312 / kg DIN for irrigation management projects $131 / kg DIN for nutrient management projects

[50]Noting that the SRA-led BIP is delivered by a consortium of delivery providers –AgriTech Solutions, Burdekin Productivity Services, BBIFMAC, DAF, Farmacist and James Cook University.

[51] Source: Lower Burdekin Implementation Guidelines

Delivery arrangements

Delivery arrangements for the Lower Burdekin Major Grants Project are summarised in Table 18 below (and further detail can be found in project documents). Grant guidelines were developed to provide information to delivery providers and growers, including key dates, eligibility requirements and assessment criteria.

Applications were prepared by delivery providers (working with growers) and assessed by delivery providers and NQ Dry Tropics. SRA administered the irrigation projects in Round 2 and NQDT administered the water and nutrient use efficiency projects (Rounds 1 and 3). All grower liaison and major grant project reporting was delivered by the providers working with the growers.

Applications were assessed for cost effectiveness, water quality outcomes (using the P2R Projector Tool), likelihood of success and co-investment value. Grant applications were also checked against previous water quality grant data administered by NQDT to ensure there was no duplication. Grants were capped at $30,000 and growers were required to co-contribute at least 50% of project cash costs.

Table 18. Lower Burdekin Major Grants Project delivery arrangements

Characteristics	**Lower Burdekin**
Number of grant rounds	3
Grant cap	$30,000
Co-contribution required	≥50% cash contribution
Grant paid as	rebate on acquittal
Open to	Round 1: Growers engaged with extension delivery providers Round 2: Growers engaged by SRA Round 3: Open to all growers but agronomic support required
DIN accounting between projects and between delivery providers.	Some batching of DIN surplus DIN savings stayed with delivery providers
Additional contributions to measurement	Use of the i-RAT

Growers were given 12 months (or to 30 April 2024, whichever was sooner) to complete their project. Delivery providers assisted growers with agronomic support. Growers received the grant as a rebate at project completion, when they provided evidence such as receipts and photos, and met other requirements including P2R benchmarking surveys.

Major grants for rounds 1 and 2 were open to sugarcane growers who were already engaged with extension projects. Grants for round 3 were opened to growers who were not already engaged with extension projects (see the following section for additional detail of each grant round).

6.3 Implementation

The Lower Burdekin Major Grants Project offered three rounds of grants between November 2022 and July 2023. Each grant round had distinct delivery approaches.

Round 1: Stoolzippas

The first round of major grants in the Lower Burdekin provided grants to growers already engaged with the Farmacist Precision to Decision Project to support the purchase of Stoolzippas. Stoolzippas (developed by DAF) close the soil slot left behind by fertiliser applicators, thus reducing nutrient loss through volatilisation and runoff (although the P2R Projector Tool does not record DIN savings). Low uptake of Stoolzippas has been attributed to the long lifespan of existing stool splitters and the cost of replacement[44]. However, uptake was disappointing[52] and only 8 Stoolzippa projects were funded.

Round 2: Automated irrigation systems

NQ Dry Tropics negotiated with SRA and GBRF to offer major grants for automated irrigation systems through the existing BIP. The BIP was an irrigation improvement project led by SRA with a consortium of delivery providers. SRA was able to work with existing and new growers to offer grants for automated irrigation systems, including purchase, installation and monitoring. The irrigation projects involved benchmarking current infrastructure performance and irrigation practices prior to the design and then implementation of new infrastructure. Once installed, further trial and assessment was undertaken to optimise detailed automated irrigation plans to match crop demand and soil water holding capacity.

For the Major Grants Project, SRA worked with AgriTech Solutions for irrigation technology and installation, and BBIFMAC for water monitoring and runoff calculations. Twelve irrigation automation projects were completed.

Note that detailed breakdown of grant information for Round 2 was not available. A nominal $57,500 was available per on-ground project which includes the grant rebate to the grower as well as SRA, AgriTech and BBIFMAC's delivery costs.

Round 3: Water and nutrient use efficiency

NQ Dry Tropics opened Round 3 to all Lower Burdekin growers (not just those already participating in a regional water quality project). Growers were still required to have agronomic support (delivery providers were resourced by the growers themselves) and meet the other project requirements. Most of the Round 3 projects improved irrigation scheduling through the installation and calibration of soil moisture sensors (GDots and GreenBrain loggers) with support from Aglantis or Farmacist. Many growers also purchased precision agriculture equipment such as GPS guidance, rate controllers and modems to improve their fertiliser and pesticide application. Thirteen projects were completed in Round 3.

[52] Source: Delivery provider and regional manager interviews.

Challenges

The main challenge experienced by the Lower Burdekin Major Grants Project was the interface between the Major Grants Project and other regional water quality projects. The initial project design assumed that extension delivery providers would facilitate growers access to major grants. Delivery providers felt that supporting the Major Grants Project was additional work that was not planned or budgeted, exceeded available capacity and had the potential to confuse or complicate services provided to growers[53]. In some cases, delivery providers also perceived contractual risks for DIN accounting[54]. The potential benefit of aligning the Major Grants Project delivery with extension projects included consistent and coherent support for growers and delivery efficiencies. Similar experiences were reported in the two other regions that ran Major Grants Projects.

In response, NQ Dry Tropics was able to negotiate a change of approach with GBRF, resourcing SRA to deliver automated irrigation projects, using a modified version of the BIP. This proved successful and the irrigation projects were high impact in terms of DIN savings despite the compressed timeframe. Further adaptation of the approach in Round 3 of grants opening grants up to growers not already engaged with delivery providers (but still ensured extension support was provided).

The use of the water quality targets provided an additional level of accountability for delivery providers and program managers, designed to ensure that grant investments were directed to water quality outcomes in a consistent and transparent way. Program managers and delivery providers across all three regions expressed frustration with the ability of the P2R Predictor Tool used to estimate water quality benefits at the scale of individual on-farm projects[55]. This can undermine uptake and the credibility of funding agencies.

Grower feedback

Growers who participated in the Major Grants Project were asked to complete a short survey (full results in Appendix C). Most of the growers surveyed had previous experience of a water quality program (66%) but 25% had not. Most growers (88%) found the grant application process easy or very easy (none found it difficult). About 30% of growers said they would not have adopted the practice without the grant. The help provided by delivery providers was appreciated. Some (16%) said they would have adopted in the next 3 years, while another third (31%) said they would have adopted the practice in the future, but probably not in the next 3 years. The balance said the grant allowed them to implement the practice at a larger scale. Most (85%) expected it to be easy to maintain the practice (none expected it to be difficult). Growers appreciated the help provided by delivery providers. Suggestions for improvements including keeping it simple, more communications and more demonstration sites.

[53] Source: Delivery provider and regional manager interviews

[54] Source: Delivery provider interviews

[55] Source: program manager and delivery provider interviews

6.4 Achievements

Number and type of projects

The Lower Burdekin Major Grants Project delivered 33 projects across 3 rounds (Table 19), including 12 automated irrigation systems (purchase, installation, benchmarking and monitoring) and 21 nutrient and irrigation management (including Stoolzippas and precision agriculture equipment such as GPS guidance and rate controllers).

Table 19. Summary of grant rounds (Lower Burdekin)

Round #	No. projects	Type of on-farm project	Project area[56] (ha)		DIN reduction estimated[11] (kg)		Grant funding[57]		Grower co-contribution (cash and in-kind)[12]	
			Total	Average	Total	Average	Total	Average	Total	Average
1	8	Stoolzippas	1,195	150	0[58]	n/a	$28,310	$3,539	$29,910	$3,739
2	12	Automated irrigation systems	1,978	165	2,975	177	$690,000	$57,500[59]	$881,512	$73,459
3	13	Nutrient and water use efficiency	1,283	99	2,613	210	$301,500	$23,192	$381,305	$29,331
Total	**33**	**n/a**	**4,455**	**135**	**5,882**	**157**	**$1,019,810**	**$30,903**	**$1,292,727**	**$39,174**

[56] Source: Final project report

[57] Source: Financial acquittals

[58] P2R does not show water quality savings for Stoolzippas

[59] Details of Round 2 grant rebates are not available. This nominal amount includes delivery provider costs as well as grants to growers.

Grant amounts and co-contributions

Grants were capped at $30,000. Details of grant characteristics, including a comparison between automated irrigation projects (round 2) and nutrient and irrigation management projects (rounds 1 and 3) are provided in Table 20 below.

Table 20. Financial details of Major Grants (Lower Burdekin[60])

Number and type of projects	Grant characteristics	Grant amount	Grower co-contribution
Automated irrigation projects (12 projects)	Range (smallest to largest)	$57,500[61]	$41,240- $179,960
	Average	$57,500	$68,828
	Total	**$690,000**	**$881,512**
Nutrient & irrigation management projects (21 projects)	Range (smallest to largest)	$2,100 - $30,000	$2,300 - $51,553
	Average	$15,702	$19,582
	Total	**$329,810**	**$411,215**
All projects (33 projects)	Range (smallest to largest)	$2,100 - $52,500	$2,300 - $179,960
	Average	$30,903	$39,173
	Total	**$1,019,810**	**$1,292,727**

In general, the automated irrigation projects were larger and more expensive on-farm projects. While the details of the on-farm grant amounts are not known precisely, the size of the projects meant that grower co-contributions were substantially larger than the nutrient and irrigation projects (on average, the co-contributions to irrigation projects were $68,828, while the average co-contributions to the nutrient and irrigation projects was $19,582).

Water quality benefits

The Lower Burdekin Major Grants Project was designed to reduce DIN exported from cane lands, and the project had a target to reduce DIN by 4,800 kg pa. The project exceeded this target by just over 20%, recording DIN savings of 5,588 kg pa, as estimated by the P2R projector tool (Table 21).

DIN savings were highly variable across on-farm projects. Eight Stoolzippa projects had no DIN savings reported through P2R. The largest DIN savings were recorded for automated irrigation projects which delivered an average of 272 kg pa DIN. In comparison, the average DIN savings for the nutrient and irrigation management projects (excluding the Stoolzippa projects) was 210 kg pa DIN.

[60] Source: Financial acquittal spreadsheets

[61] Nominal grant amounts for all Round 2 projects were $57,500 and included on-farm grants as well as delivery provider costs

In addition to the targeted DIN savings, P2R data also recorded predicted soil and pesticide savings (9,161 tonnes pa of soil savings and 428 grams pa of pesticide savings). Soil savings were split equally between irrigation automation and nutrient and irrigation management projects, while pesticide savings were mostly recorded for the smaller nutrient and irrigation management projects.

Table 21. Water quality benefits of the Major Grants Project (Lower Burdekin)

Number and type of projects	Characteristics	DIN savings (kg pa)
Automated irrigation projects (12 projects)	Range (smallest to largest)	17-709
	Average	248
	Total	**2,975**
Nutrient & irrigation management projects (21 projects)	Range (smallest to largest)	0 - 270[17]
	Average	124
	Total	**2,613**
All projects (33 projects)	Range (smallest to largest)	0-709[62]
	Average	169
	Total	**5,588**

Cost-effectiveness of DIN savings

Overall cost-effectiveness was calculated as the total project cost (on-farm grants plus project delivery costs) per total DIN savings. The Lower Burdekin Major Grants Project achieved an overall cost-effectiveness of $268/kg DIN, somewhat less than the target of $234/kg DIN.

The Lower Burdekin Major Grants Project also articulated benchmarks for on-ground cost-effectiveness based on data from previous, similar projects in the region. The on-ground cost-effectiveness benchmarks are calculated as grant cost/DIN savings (excluding project delivery costs). Both the automated irrigation projects and the nutrient management projects exceeded the on-ground cost-effectiveness benchmarks (Table 22).

[62] Note that 8 Stoolzippa projects had no recorded DIN savings

Table 22. Water quality and cost-effectiveness achievements (Lower Burdekin)[63]

Parameter	Targets	Achievements
Water quality target	DIN: 4,800 kg pa	DIN: 5,588 kg pa
Overall cost-effectiveness target (DIN) [64]	$234 / kg DIN	$268 / kg DIN
On-ground cost-effectiveness benchmarks (DIN)	$312 / kg DIN for irrigation projects $131 / kg DIN for nutrient projects	$232 / kg DIN for irrigation projects $115 / kg DIN for nutrient projects

Additional benefits

The Lower Burdekin Major Grants Project contributed to the local economy through resourcing local manufacture and supply of equipment (c. $2.3M including grants and grower co-contributions). In the case of the automated irrigation projects, system design and monitoring services were also sourced locally. The overall investment in local service delivery and supply chains will provide ongoing support to growers and any future water quality programs.

The additional modelling (i-RAT) and monitoring undertaken for the automated irrigation projects made a useful contribution to local and more general knowledge about the water quality benefits of automated irrigation. The i-RAT modelling tool was funded by GBRF under the WQ Innovation Program and its use in the Major Grants Project helped to provide credible evidence of water quality benefits to participating growers. The results should be shared with local growers (via future field trips and demonstration days) and other interested parties e.g. P2R team and research scientists.

The investment in automated irrigation is likely to have spillover effects on local industry norms. Irrigation is large and highly visible infrastructure. The water quality monitoring and i-RAT modelling undertaken for the irrigation projects has provided compelling evidence of benefits to growers. Current adoption of automated irrigation is very low (c. 10 out of 850 farms)[65], whereas BIP and the Major Grants Project have supported c. 45 irrigation projects, which may contribute to shifting the regional practice norms towards greater adoption of this technology.

[63] Source: Final project report

[64] Source: Lower Burdekin Implementation Guidelines

[65] Source: Program manager interview

6.5 Summary

The Lower Burdekin Major Grants Project successfully delivered 33 grants across automated irrigation systems and nutrient and irrigation management practices. The Major Grant Project met and exceeded targets for DIN savings, and although overall cost-effectiveness was less than targeted, on-farm benchmarks for cost-effectiveness were met. Growers found the process easy or very easy.

There were some issues with how the major grants interacted with other regional water quality projects. NQ Dry Tropics negotiated several changes with GBRF, commissioning grants for automated irrigation projects through SRA and widening access to grants for nutrient and irrigation management practices.

The key learnings apparent in the Lower Burdekin Major Grants Project include the following:

- The benefits of commissioning all water quality projects at the same time, so cross-dependencies can be clarified and incorporated into project contracts if required.
- Established service providers can efficiently and confidently deliver water quality projects because they know their industry networks, their growers, and have prior experience to draw upon. Competition may add an efficiency driver.
- The P2R Projector Tool is constrained in its ability to assess the water quality benefits of individual projects. This was evident in the Stoolzippa projects (which recorded 0 DIN benefit) and the irrigation projects. The i-RAT tool provides a promising complement to P2R to estimate the benefits of irrigation projects.
- Benchmarking and monitoring irrigation practice before and after changes provides compelling evidence of benefits to growers and downstream ecosystems. This information should be shared locally and more widely in the science community.
- Incorporating DIN targets in delivery provider contracts provides clear performance measures but accounting processes (particularly between projects) need to be resolved.
- The benefits of investing in irrigation automation appears to offer substantial water quality benefits as well as water, power and labour advantages to growers. The cost-effectiveness and legacy of this approach to a capital-intensive practice with significant benefits and low current uptake is an attractive case for further investment in the Lower Burdekin.

7. Learnings and recommendations

This section reflects on the learnings of the Major Grants Projects and makes recommendations for consideration by future grant program commissioners and program managers.

Regional program governance and delivery

The Major Grants Projects benefitted from governance arrangements that supported oversight and accountability, used local knowledge and networks to good effect, and enabled flexibility and ability to tailor the programs to regional circumstances. Key features of the governance model included:

- Regional steering committees
- Centralised regional delivery of the major grants including grants administration and overall program coordination roles
- Close and flexible working relationship with the investor so that the grants scheme can be optimised to the regional circumstances

Recommendations:

Rec. 1. Future grant programs should consider how regional governance arrangements can support appropriate oversight and accountability, access to local knowledge and networks, but also enable flexibility and adaptation. Where grant programs need to be adapted, manage the potential for inequity and confusion that may arise with changes over time.

Rec. 2. How grants are disbursed needs to fit regional circumstances, but there is clear value in centralising (at the regional scale) a grant administration role that can lead grant administration and assessment processes, coordination of the regional delivery network, reporting of activities and outcomes, regional monitoring and evaluation and public communications.

Design of grants program and fit with other delivery provider projects

The RTP Major Grants Projects were designed to fit each regional circumstance. Water quality targets were incorporated into project contracts with delivery providers for both major grants and extension projects. Integration of extension services with grant delivery was integral to the program design, yet there were several challenges in how this worked in practice:

- Competition between delivery providers for growers (particularly in the early stages of the program, and for delivery providers who were new to reef water quality programs).
- Major grant projects were commissioned after extension projects and assumed that extension delivery providers would also support the Major Grants Project. This was not always the case – some service providers felt this was an additional workload that there were not able to meet.
- There were disputes over the allocation of water quality savings between delivery providers (because of contracted targets). Programs were adapted

but, in some cases, this resulted in perceived inequalities between delivery providers.

Recommendations:

Rec. 3. Consider the design of grant programs as an integral part of regional water quality programs. Ensure that interdependencies between projects are recognised and contracted appropriately.

Rec. 4. Carefully consider the value of major grants in each regional context. Prioritise farming practices with high public benefit (water quality savings), that are in the early stages of adoption, where adoption is constrained by up front capital costs and serviceable by local support such as extension, design, supply or manufacture and monitoring. Invest in up-front planning and design to ensure grants are appropriate and effective. The design of regional programs should draw on multiple lines of evidence including local agronomic expertise, field trials etc. as well as P2R Projector results. Greater emphasis on planning and design could also allow more targeted commissioning of regional delivery provider services.

Rec. 5. Grants should be accompanied by appropriate extension support (preferably sustained over several growing seasons) to ensure practices are well established before extension support is concluded. Cash co-contributions are an effective way to ensure grower commitment to using tools and equipment purchased with the support of grants. RTP used a minimum of 50% grower co-contributions, and a sliding scale for larger projects (proportionally less grant funds above a certain amount) in one region. Larger grants are likely to attract larger projects for bigger enterprises, which may offer larger water quality benefits (potentially also larger private benefits), less cost to administer, probably less dis-adoption but potentially less additionality. Consider the trade-offs of different grant amounts (minimum and maximums) including equity between growers.

Accounting for water quality

The P2R Projector Tool was used to estimate water quality benefits. While using a single tool improved transparency and accountability by providing a consistent way of accounting for water quality benefits, in several areas the tool was not able to assess benefits effectively. This was true for mill mud application (removed from latest version of P2R), for pesticide practices, irrigation and some equipment like Stoolzippas. Delivery providers and program managers have low confidence in the accuracy of the P2R Projector estimates at this scale. These limitations can result in inaccurate reporting of benefits, in perverse funding decisions, credibility issues (some funded projects show no water quality benefits) and disenfranchisement of growers and delivery providers.

In two cases the RTP Water Quality Program supported the further development of complementary assessment methods (i-RAT and PDST) that were then used to strengthen assessment processes in the Major Grants Project. Both were useful additions, as was site-based benchmarking and monitoring of the irrigation projects in the Lower Burdekin. These allowed grant projects to move ahead and improved confidence in outcomes. The Lower Herbert grant program used an assessment panel to oversee the assessment process, and

that allowed a transparent and independent oversight that was able to consider multiple criteria alongside P2R Projector estimates.

All regional grants programs had to adapt to deal with the limitations of the P2R Projector Tool in estimating the benefits of individual grant projects. This was further confounded by the close connection between the water quality savings claimed by the extension project e.g. nutrient management planning, and an associated grant e.g. purchase of fertiliser equipment. GBRF was able to adapt programs with the local grant managers in various ways such as bundling several projects together so that they collectively met water quality benchmarks, so while some individual projects would be above the benchmark and others below, overall, the benchmarks were achieved. While this allowed projects to achieve cost-effectiveness targets collectively, it reduced the ability to track the benefits of individual grants. Delivery providers had water quality targets embedded in their service delivery contracts. Determining how water quality savings were allocated across providers (e.g., where growers were engaged by both extension service providers and major grant delivery providers) also created complexity in the reporting of water quality outcomes.

Recommendations:

Rec. 6. Assessing major grants based on their water quality benefits is highly desirable, but the P2R Projector Tool is limited in its capacity to provide project-scale predictions to service this application. Future grant programs should consider ways of strengthening the process to assess water quality benefits, including:

- *Alternative or complementary use of other tools for specific applications e.g. irrigation, mill mud, pesticides*
- *Use of assessment panels that include independent technical experts and local knowledge holders*
- *Development of other decision rules to support robust, transparent and consistent decision-making about grants.*

Rec. 7. Rules about how water quality benefits are assessed, aggregated, and allocated should be determined before the grant program is contracted. Grants and extension are complementary services, and it can be difficult to disentangle their contribution to water quality savings. Nonetheless, individual grant projects need to be able to demonstrate their value for public investment in water quality outcomes, and accounting rules need to assess this in transparent, consistent and defensible ways. The pros and cons of incorporating water quality targets in delivery provider contracts should be carefully considered as it can drive additional complexity in reporting systems.

Monitoring and evaluation

Having common monitoring and evaluation frameworks for grant projects across multiple regions is very useful for supporting cross-regional evaluations. The very simple grower survey (just 7 questions) yielded useful information for this assessment. Survey data collection by local providers is often problematic in water quality programs and the Major Grants Projects were no exception (e.g., late and patchy completion of surveys). Reconciling different survey instruments via common project identification codes should enable deeper analysis but this proved challenging in this instance. The limitations of the process to assess

water quality benefits described above (P2R Projector limitations, and work arounds including bundling projects) meant that the water quality benefits of some grant projects were not clear (although overall targets and cost-effectiveness benchmarks were met).

Recommendations:

Rec. 8 Apply a set of common monitoring and evaluation measures across similar regional grant projects to allow comparative analysis. Ensure that appropriate data collection protocols and training are in place. Ensure that all grant related datasets share a common project identification code so that best use can be made of all available data.

Summary of recommendations

1. Consider how regional governance arrangements can support appropriate oversight and accountability, access to local knowledge and networks, but also enable flexibility and adaptation.

2. Centralise (at the regional scale) a grant administration role that can lead grant administration and assessment processes, coordination of the regional delivery network, reporting of activities and outcomes, regional monitoring and evaluation and public communications

3. Interdependencies between grant programs and other regional programs should be recognised and contracted appropriately.

4. Carefully consider the value of large grants in each regional context (i.e. enterprise characteristics including current practices and prospects for change). Invest in up-front planning to identify where grants will overcome financial barriers to adoption and add value to other incentives.

5. Grants should be linked to appropriate extension support and include a significant grower co-contribution (>=50%). Consider the trade-offs of different grant amounts (minimum and maximums) including equity issues.

6. Assess grants for water quality benefits but strengthen assessment methods to overcome the limitations of the P2R Projector Tool.

7. Rules about how water quality benefits are assessed, aggregated, and allocated should be determined before the grant program is contracted. Individual on-farm grant projects need to be able to demonstrate their value for public investment in water quality outcomes, and accounting rules need to assess this in transparent, consistent and defensible ways.

8. Apply a set of common monitoring and evaluation measures across similar regional grant projects to allow comparative analysis. Ensure appropriate data collection protocols and training, and common project identifiers across related datasets.

9

Appendix A: Grower survey results (Mackay Whitsunday)

At the time of preparing this report (June 2024) 55 grower surveys have been completed, (57 were entered but 2 were incomplete so discarded). An additional 18 grower surveys are expected to be completed.

All growers were happy to answer the survey questions. Twenty growers (36%) wanted to receive a summary of the survey results.

Q(C) What was the grant used for?

Of the 55 growers surveyed, the most common uses of the grant were for:

- GPS and/or rate controllers (40% of grants)
- herbicide spray rigs or booms (33%)
- purchase of high-rise spray rig tractors (18%)
- stool splitters/fertiliser applicators (9%)
- fertiliser boxes (11%).

Other items listed in survey responses (by 4 or less growers, so <7% of grant projects) include air seeders, chemical tanks, planters/disc openers, spreader, zonal tillage equipment and yield monitor.

Note that because of variation in how the projects were described in the survey, these figures should be considered indicative rather than precise. Also note that many projects included multiple items, and several involved modifications to existing machinery.

Q(D) What sort of practice will that improve?

Major grant projects in the Mackay Whitsunday region were evenly split between fertiliser management (47% of projects) and herbicide management (51%) of projects. Two projects (4%) were about tillage management and no projects were about irrigation management.

Q1 Which age group do you belong to?

Most growers (74%) were in the 45 to 65-year age group (slightly more in the 55-64-year age group than the 45-54-year age group) (Figure 6). Some growers (7%) were 65 years or older, and 18% were under 45 (mostly in the 25-34-year-old age bracket).

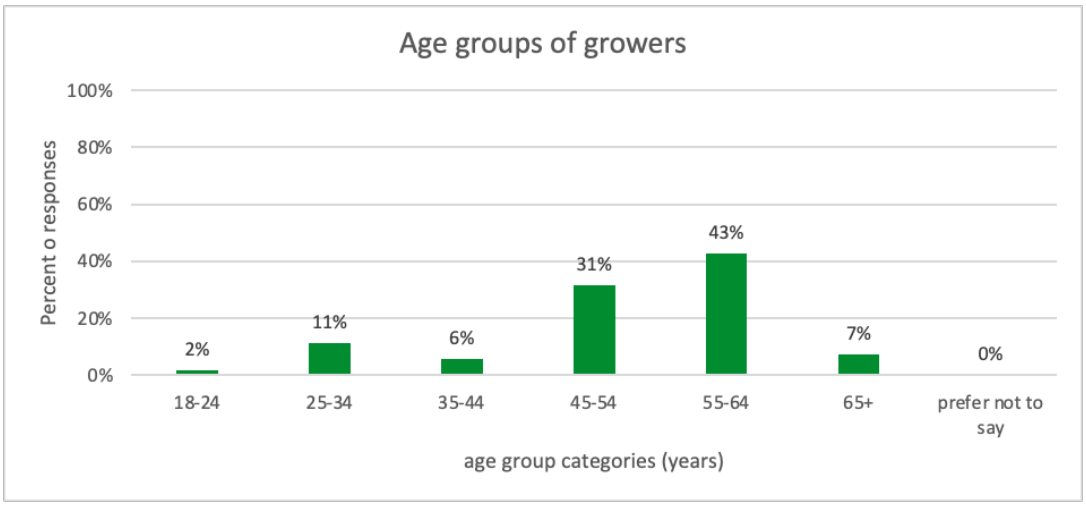

Figure 6. Age distribution of growers (Mackay Whitsunday)

Q2. Have you previously participated in a water quality program?

Over half of the growers (63%) had previously participated in a water quality program (Figure 7). Only 2 growers (4%) said they had participated in previous water quality projects quite a few times (3 or more), while the balance said 1 or 2 times previously. Thirty-seven percent of growers that participated in the Major Grants Project had not previously participated in a water quality program.

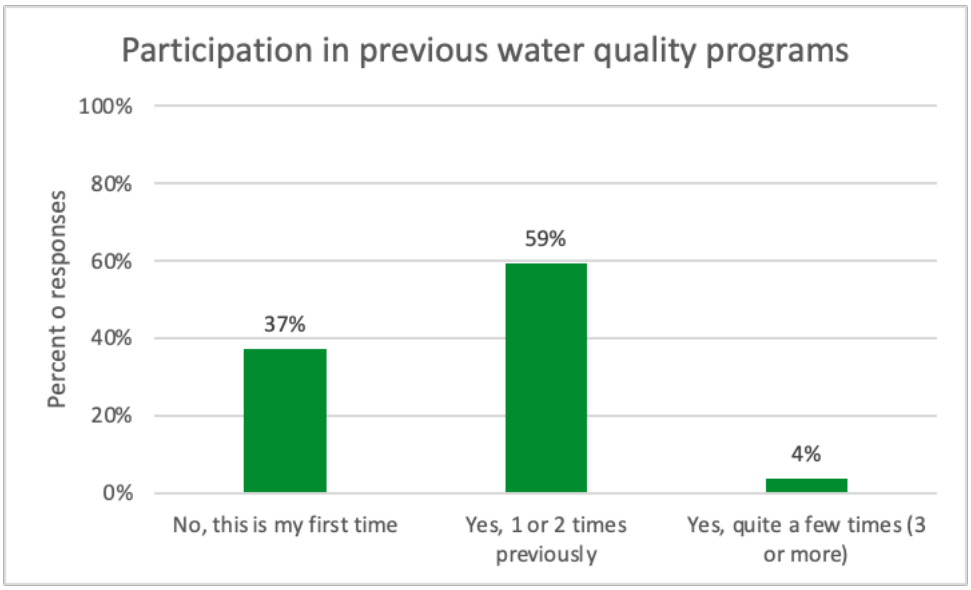

Figure 7. Participation in previous water quality programs (Mackay Whitsunday)

If yes, what programs have you previously participated in, in the last 5 years?

Twenty-nine growers answered this question. Most said their previous project/s were more than 5 years ago (28%) or they couldn't remember (24%). The project most cited in last 5 years was Project Bluewater (28% of growers). Other projects listed by 1 or 2 growers included Reef Rescue, Jane's Creek and Sandy Creek projects.

Q2A. Did the availability of major grants influence your decision to participate in the program?[66]

Just over half (56%) of growers said that the availability of the major grant was a big influence on their decision to participate in the water quality program (e.g. the main reason they participated). Of the remainder, 30% said that the availability of the major grant had some influence on their decision (but not the main reason they participated) while 15% said the grant did not influence their decision to participate.

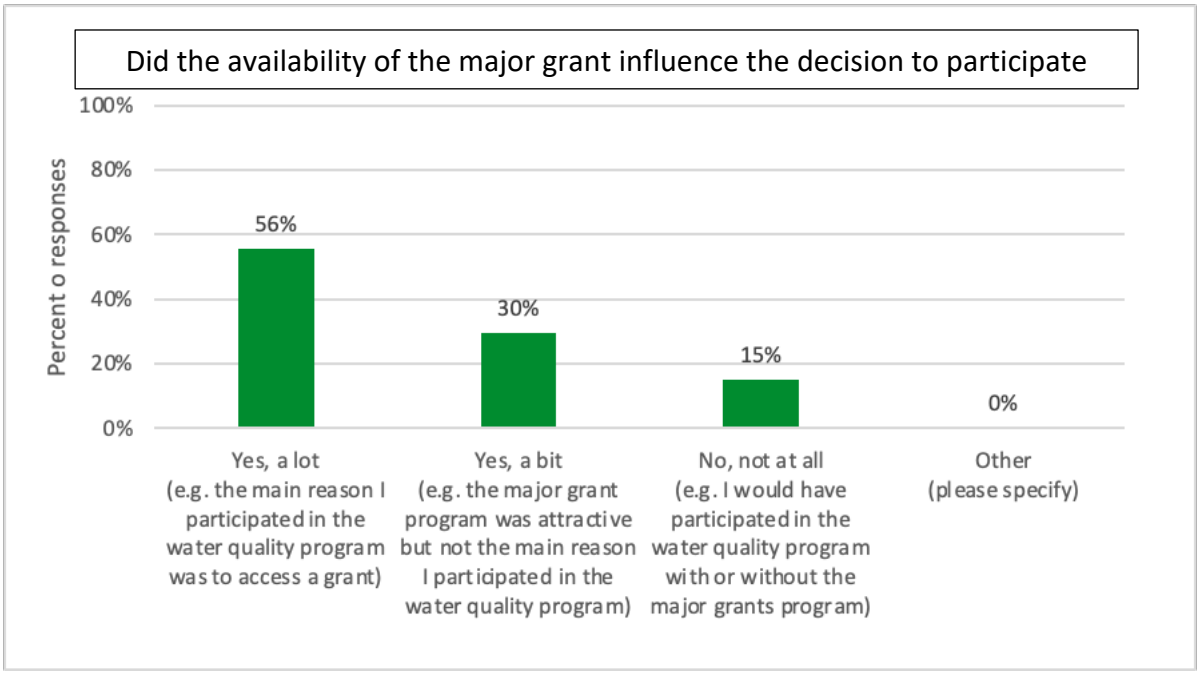

Figure 8. Influence of the major grant on program participation (Mackay Whitsunday)

The influence of major grants on program participation did not vary between growers who had not previously participated in a water quality program and those that had (Figure 9). For this comparison, the results of those who had participated in previous water quality programs (1 or more times) were compared to those who were first time participants.

[66] This question was added to the Mackay Whitsunday grower surveys. The idiosyncratic numbering allowed consistent numbering of survey questions between regions.

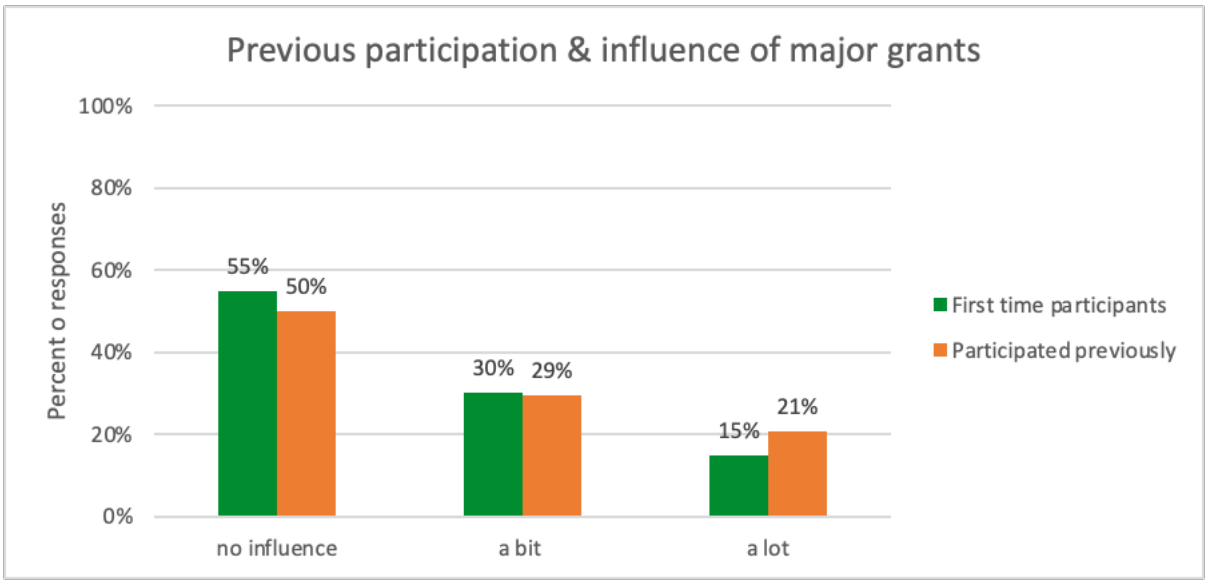

Figure 9. Comparing the influence of major grants on those who had or had not previously participated in water quality projects (Mackay Whitsunday)

Q3. How did you hear about the grant program?

Most of the growers surveyed (78%) in this region had heard about the grant program from delivery providers (Farmacist, Liquaforce, Mackay Area Productivity Services or Plane Creak Productivity Services) (Figure 10). The other growers heard about the grant program from family members or another famer (7%), from an industry newsletter or email (7%) or from attending an event such as field day (7%).

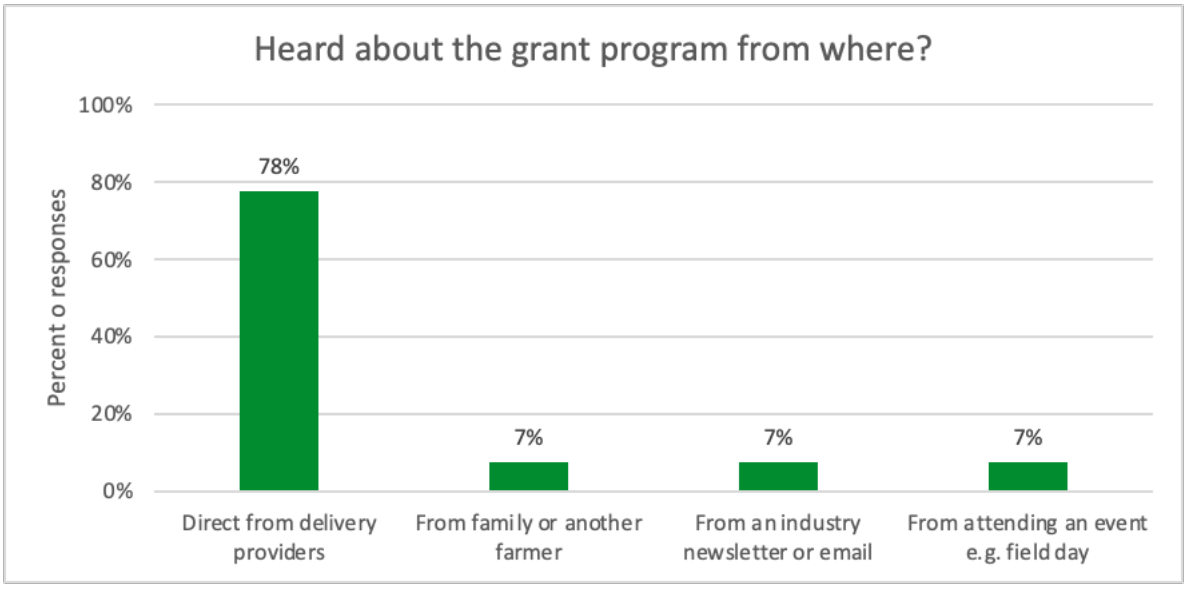

Figure 10. Where growers heard about the grant program (Mackay Whitsunday)

Q4. How did you find the process to apply for a grant?

Most growers found the process to apply for a grant very easy (50%) or quite easy (44%) (Figure 11). One grower said it was neither easy nor difficult (2%), one said it was quite difficult, and one said it was very difficult.

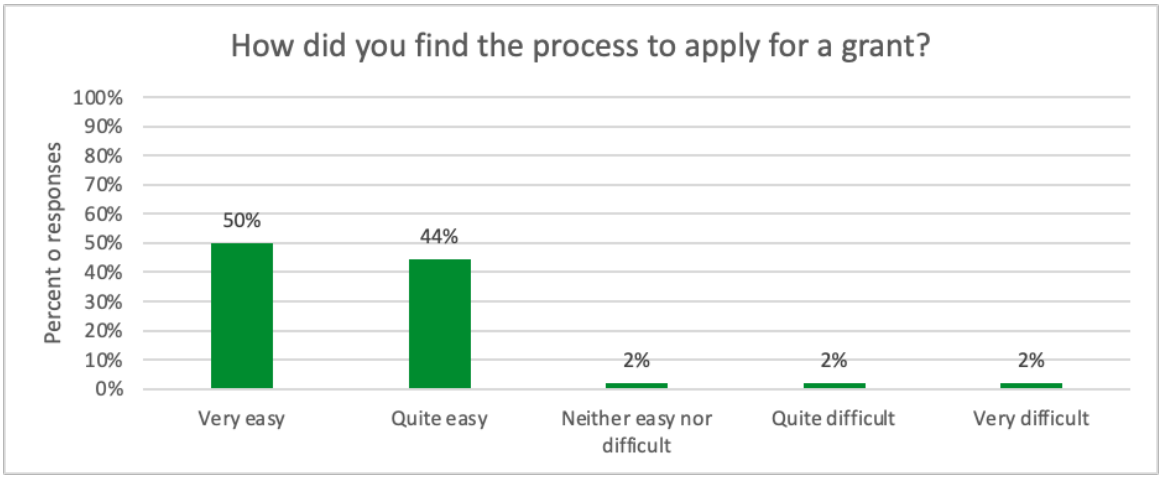

Figure 11. Ease of the grant application process (Mackay Whitsunday)

What did you find easy or difficult about the grant application process?

Thirty-five growers provided comments about the grant application process, and these were almost all positive and mostly referred to the help provided by delivery providers (Table 23). Forty-three percent of comments mentioned Farmacist, 23% mentioned MAPS, 11% Reef Catchments Ltd and one person (3%) mentioned PCPSL. A further 11% just mentioned the help they received (without specifying from who) and 9% said the process was easy.

Positive comments are exemplified by the following:

"It was easy to touch base with Ruby and everything was done via email. Very efficient process"

"MAPS did most of the hard work for me."

There were a few critical comments, but notably these all said the issue was resolved:

"Issues with them thinking I would use tractor for something else. Also issues with not qualifying for grant money in the beginning."

"Purchased similar item 7 years ago so was denied, but this was a different farm and business number. After back and forth it eventually go"

"Time delay from application to confirmation was too long; no one coming to have a look to see what I wanted to do; the initial calculation for the amount of money the grant was for was far too low...that eventually got fixed."

Table 23. Comments on the ease of the grant application process (Mackay Whitsunday).

Comments provided about the grant application process
simple process
MAPS did it and the application was simple
Farmacist organised everything with Reef Catchments
talking with the staff
Purchased similar item 7 years ago so was denied, but this was a different farm and business number. After back and forth it eventually go approved.
MAPS did most of it
MAPS did most of it for us
MAPS did it all.
Farmacist and my wife took care of it all.
Farmacist filled it all in for me
Issues with them thinking I would use tractor for something else. Also issues with not qualifying for grant money in the beginning.
Surprised there was money. Farmacist did a lot of the work for me.
Time delay from application to confirmation was too long; no one coming to have a look to see what I wanted to do; the initial calculation for the amount of money the grant was for was far too low...that eventually got fixed.
MAPS did most of the hard work for me.
MAPS was helpful
Dave McCallum helped at MAPS
Good support and useful application forms
Farmacist helped a lot
Farmacist aids you
everyone's help
The MAPS Representative
It was easy to touch base with Ruby and everything was done via email. Very efficient process
Easy to apply
otherwise, would have to continue to borrow from the neighbour's farm which causes biosecurity risks and timing conflict
Ruby and Adam were excellent throughout the process and very helpful and obliging
Farmacist did it all
Farmacist helped a lot
Between RCL and Farmacist it was easy
Farmacist helped them fill it all out
Farmacist helped to do it all
Jess from PCPSL was very organised and helpful.
Farmacist went through the application form with me, helping every step of the way making the application process easy.

Comments provided about the grant application process
Farmacist did it all
I found that Farmacist provided great help towards applying for the grant, filled out the application together and explained through the whole application process.
Farmacist came to the property with the paperwork and helped me fill everything out, also gave a detailed understanding of what the Major Grant was about.

Q5. How could we improve future grant programs? Any suggestions

Twenty growers made suggestions for future grant programs (Table 24). The comments could be grouped into five categories:

- make the process faster, easier or simpler (24%)
- more advertising (19%)
- more communication (19%) (noting that communication could refer to both awareness raising such as advertising, as well as engagement and communication with delivery providers)
- making the grants more widely available, encouraging more new growers (19%) and
- that the current program worked well (19%) with no suggestions for changes.

Some illustrative quotes are provided below (and all responses are listed in Table 24).

"More advertising in industry publications"

"Better communication and a faster applying process"

"Open it up to more growers."

Table 24. Suggestions for improvements (Mackay Whitsunday)

Suggestions for future grant programs
Get more new growers a chance to receive a grant. It seems the same growers get the grants every time or get more than one by using loopholes
Already really easy; maybe advertise more.
Learn about it earlier
once you know about it, it was pretty straight forward.
make the process easier
Make it more widely available. Invest in money on the ground that will actually improve water quality...that includes spray rigs, rate controllers, GPS, irrigation, fertiliser boxes, etc.
Advertise better exactly what is available.
none; lots of grants available is good
Better communication
They seem to be running well.

Suggestions for future grant programs
More 1 on 1 conversations. Better engagement in a timely manner.
have more of them available to everyone
More advertising in industry publications
make it known more easily
Open it up to more growers.
Keep it simple (see above)
More Communication about the program
Time to apply for grants as I work outside of the farm.
Worked well for us.
better communication and a faster applying process

Q6. Which of the following statements best describes the impact of the grant you received?

When asked about the impact of the grant, a third (33%) of growers said they would probably have adopted the practice in the next three years, 28% said they would not have adopted the practice without the grant, and 26% said the grant allowed them to adopt the practice at a much larger scale than they would have otherwise, and 11% said they would probably have adopted the practice sometime in the future (more than three years) (Figure 12). One grower chose 'other' and explained "Was about to purchase this anyway when MAPS told us there was grant money available."

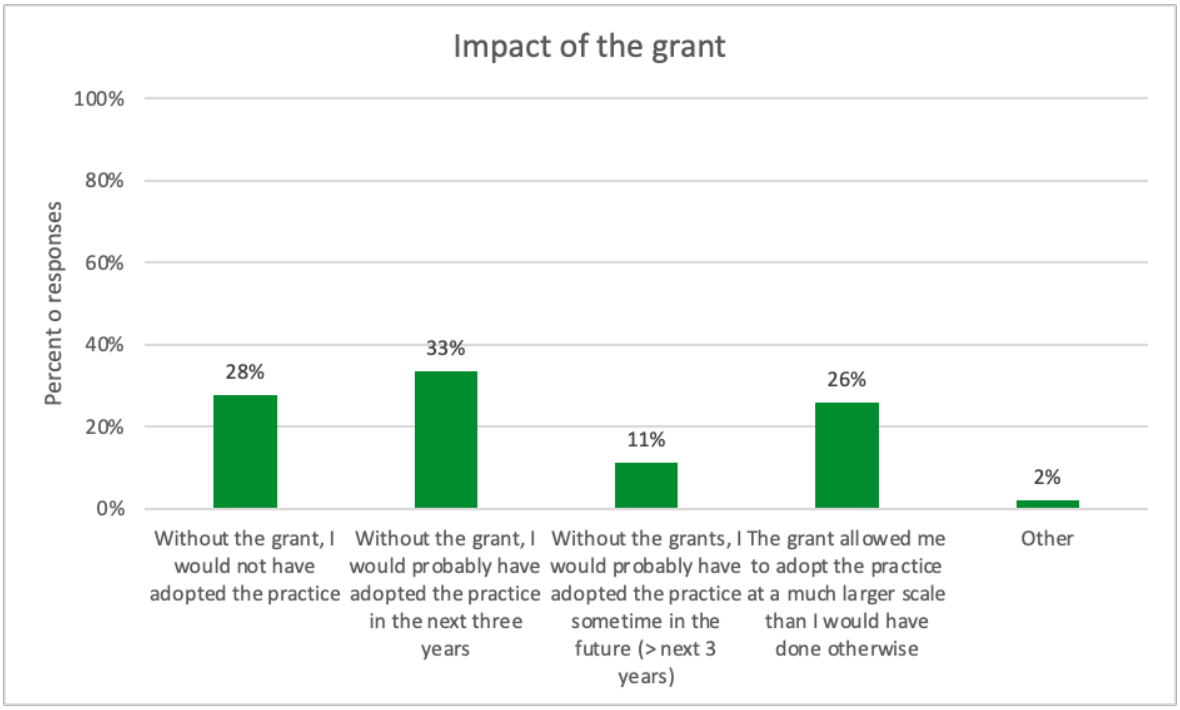

Figure 12. Impact of the grant (Mackay Whitsunday)

The relationship of these results to grower's previous participation in water quality programs was further explored. These graphs are presented as grower numbers not percentages as the numbers of growers in each category are quite small. For this reason, the results are indicative only and should not be considered statistically significant. It also worth noting that these categories are not mutually exclusive, for example, the grant may have influenced a grower to bring adoption forward some years, *and* to adopt it at a larger scale (but growers select one answer, presumably the one that best fits their experience).

The relationship between previous participation in water quality programs and the reported impact of the grant was explored (

Figure 13). In most categories of grant impact, the proportion of growers who had or had not previously participated in water quality programs was roughly equal. This was not the case, however, for the growers who reported that, without the grant, they would probably have adopted the practice in the next three years. It could be assumed that those growers were already considering the practice, and the grant allowed them to adopt it sooner. Results suggest that growers who had previous experience of water quality programs and wanted to adopt a new practice sought from the program (more than actively than other growers).

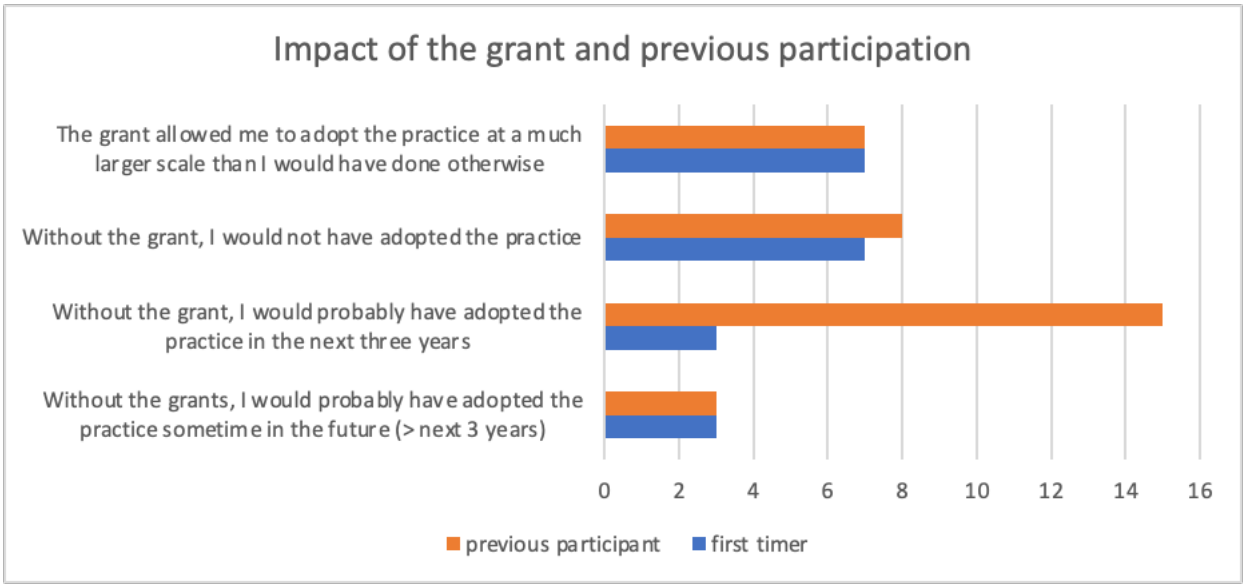

Figure 13. Impact of the grant on adoption, and previous participation in water quality programs (Mackay Whitsunday)

Q7. How difficult do you think it will be to maintain the practice that the grant helped you with?

Most growers expect maintaining the practice to be very easy (59%) or easy (33%) (

Figure 14). No growers felt that it was going to be difficult.

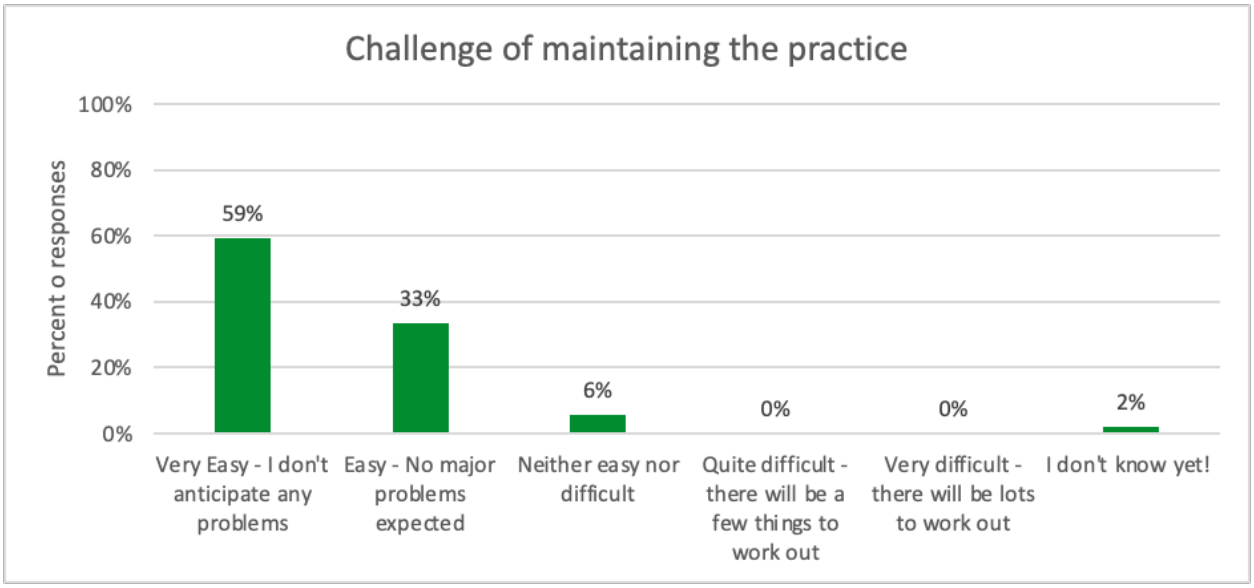

Figure 14. Difficulty in maintaining the practice (Mackay Whitsunday)

What do you expect will be the biggest challenge in maintaining the practice?

Twenty-seven growers provided a response (Table 25) but most of these (59%) said "nothing". Of the other growers, three (out of 11) mentioned weather and time, three also mentioned technology, and others (one each) said access to product, labour, record keeping and setting the farm up for controlled traffic were their biggest expected challenges.

Table 25. Biggest challenge in maintaining the practice (Mackay Whitsunday)

Biggest challenge to maintaining the practice
Record Keeping
Setting the farm up for controlled traffic
tech stopping working
the technology
Timing of application
weather and time
weather and time
Weather changes year on year.

Q8. Are there any other comments you would like to make about the grant program?

Seventeen growers provided additional comments, and about half of these (56%) made positive statements about the program (Table 26). Four growers (22%) suggested the program needs to continue. Four growers (22%) commented about cost-effectiveness criteria and program communications.

Table 26. Other comments from growers (Mackay Whitsunday)

Other comments
Like to see these grants continue in the future.
Everything was great
Happy I could get the grant. I wouldn't have gotten this tractor without it.
no. happy to have been able to get a grant.
More grants are needed to support smaller farms and the younger generation of farmers coming up.
Not enough info out there for how to access these programs. Better to be centrally located like on CaneRise
very easy and would like to do more.
really good. has helped a lot
Very happy with the progress and outcome
make it easier for smaller growers
Easy to do
I have been very impressed with the ease of working with Reef Catchments and all the staff has been great to work with.
Keep them coming
It helps immensely to get this sort of equipment otherwise it would generally be outside of the financial realm for growers.
Smaller growers don't achieve Cost effectiveness because they have a small Ha, but we still have to buy the same amount of equipment as bigger growers.
Helping to make better practices sooner.
I had been given the expectation that the whole grant would be received if I met everything in the criteria which I did. I found there was no communication about the cost effectiveness and Farmacist told me they strongly believed I would receive the whole grant amount. I also felt there was a longtime between the grant getting started to actually receiving any of the grant money. I felt that the lack of evidence I was given to understand why I didn't receive more money and in the future would like proof not that I just didn't reach Cost-effectiveness.

Appendix B: Grower survey results (Lower Herbert)

At the time of preparing this report (June 2024), 50 grower surveys had been completed (after removing five duplicate entries). An additional 45 grower surveys are expected (31 growers have been given extensions).

Of the 50 grower surveys entered, only half (51%) were happy to answer the survey questions, and the others declined. In the other regions (Mackay Whitsunday and Lower Burdekin) all growers were happy to answer the survey questions. Thus, there are 50 answers for the first two questions below (that were completed by the interviewer) but only 25 answers for the following questions. None of the Lower Herbert growers wanted to receive a summary of the survey results.

Q(C) What was the grant used for?

Of the 50 growers surveyed, most (50%) used the grant for a GPS rate controller, or a stool splitter and fertiliser box (24%). Legume planters were purchased by 16% of grantees, bed former/renovator & crumble rollers by 12% and mounders by 8%. Three or less growers invested in air seeders (6%), mill mud applicators (4%), legume mulchers (4%), a drone sprayer (2%) and fertiliser spreader (2%).

Q(D) What sort of practice will that improve?

All projects improved fertiliser management. Ten projects also listed tillage management (20%), while two listed runoff management (4%) and one listed herbicide management (2%).

Q1 Which age group do you belong to?

Most of the 25 growers who answered the survey questions (40%) were in the 55–64-year age category (Figure 15). A quarter (24%) were older (65 or over). Sixteen percent were in the 45–54-year age group, 12% were 35-44 years and 8% were 25-34 years old. None were younger than 25 years old.

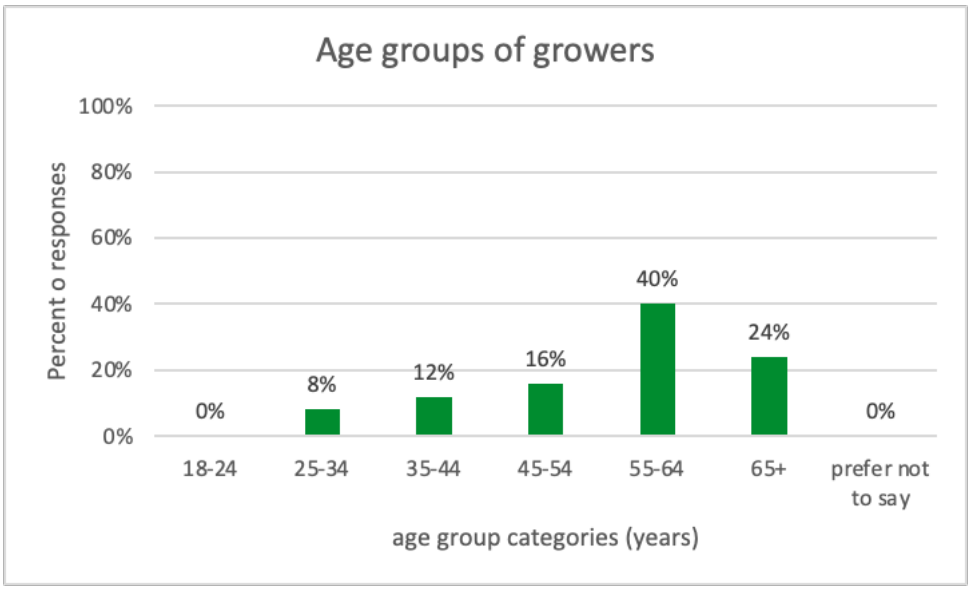

Figure 15. Age distribution of growers (Lower Herbert)

Q2. Have you previously participated in a water quality program?

For most growers (84%) this was the first time they had participated in a water quality program (Figure 16). Of the 25 that completed surveys, three (8%) had participated in 1 or 2 previous water quality programs and three (8%) had participated quite a few times (3 or more). Of those that had participated previously, one said they had had a previous Major Grant Project, and one had participated in Reef Rescue.

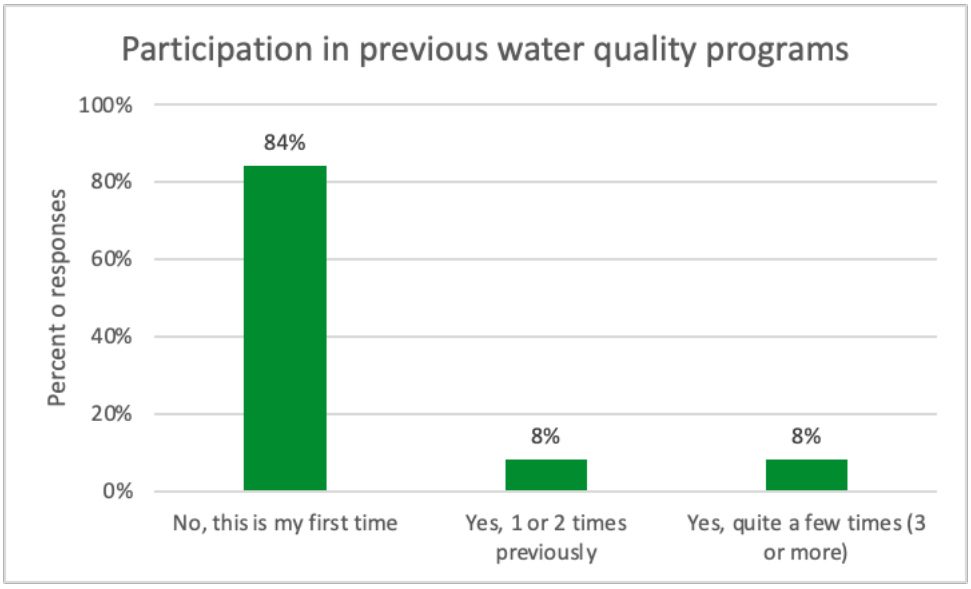

Figure 16. Participation in previous water quality programs (Lower Herbert)

Q3. How did you hear about the grant program?

Almost all (88%) of the growers surveyed heard about the grant program direct from CANEGROWERS Herbert River (Figure 17). A further 12% heard from family members or another farmer, and no growers reported hearing about the program from an industry newsletter or email. One person said they heard about the program from their accountant.

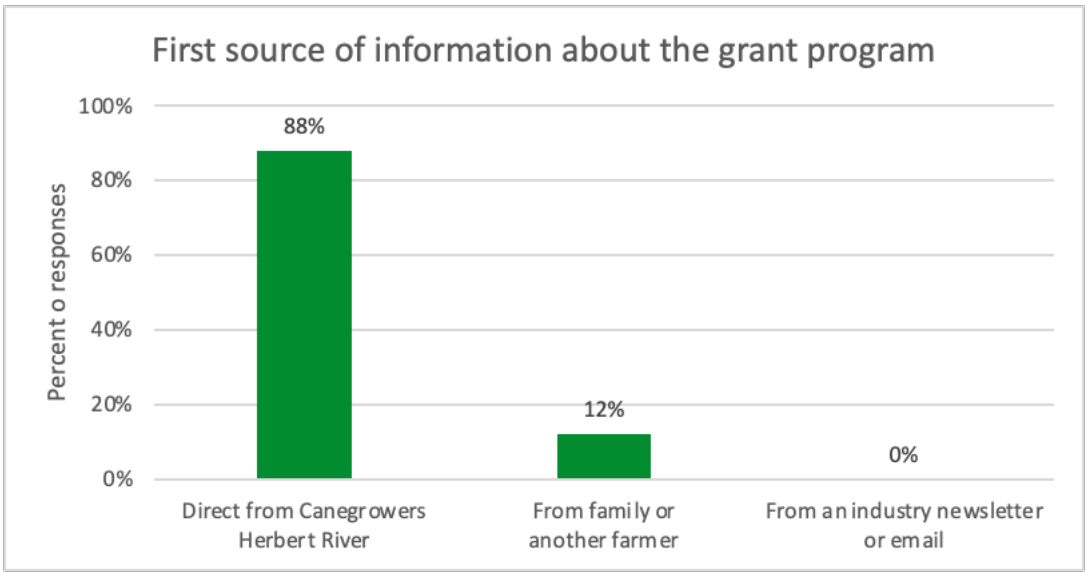

Figure 17. Where growers heard about the grant program (Lower Herbert)

Q4. How did you find the process to apply for a grant?

Most growers found the process to apply for a grant quite easy (52%) or very easy (32%) (Figure 18). The balance said it was neither easy nor difficult (16%). No growers said the process to apply for a grant was quite difficult or very difficult.

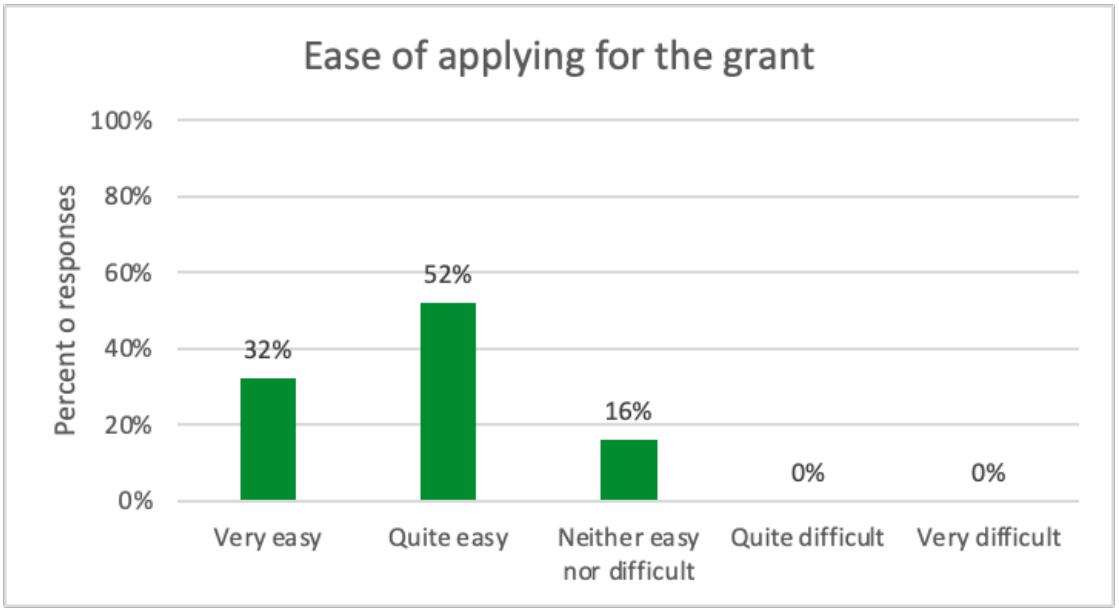

Figure 18. Ease of the grant application process (Lower Herbert)

What did you find easy or difficult about the grant application process?

Fourteen growers answered this question. Most of the comments (86%) were about the help provided by CANEGROWERS Herbert River, and 36% also said the process was easy (Table 27). There was one comment that the process would be daunting without support, one comment about the BMP process being difficult because of incorrect farm maps, and one comment about difficulty in getting a fertiliser box manufactured in time.

Table 27. Comments on the ease of the grant application process (Lower Herbert).

Comments about the grant application process
Leah & Paul were very helpful, and I felt comfortable with them
No different to any other grant. Just need to provided invoices/receipts and photos.
CANEGROWERS made the process easy
Great help and support from CANEGROWERS Herbert River
The application process was easy, and the CANEGROWERS were very helpful in our application.
The grant process was made easier with the help of CANEGROWERS Herbert River executives.
Grants officer was very helpful with application
The facilitators made the process much more achievable. Without them, many would find the process somewhat daunting.
Easy because CANEGROWERS Herbert River helped the process and difficult because BMP process was difficult because of incorrect farm maps.
The canegrowers Paul Marbelli & Leah Russo were of great assistance
The process was easy enough, as we had great help processing the application from staff at CANEGROWERS Herbert River.
Difficult to get the box made in time for upcoming season
Help from CANEGROWERS Herbert River
Leah & Paul made the process very easy

Q5. How could we improve future grant programs? Any suggestions

Twelve growers made suggestions for future grant programs (Table 28). Half (50%) said that no improvements were needed, and one said do more grant programs. Three growers commented about bringing the final grant payment forward (cash flow). One grower suggested a more favourable funding ratio (more than 50:50) and one said not to include BMP as a requirement because it puts growers off.

Table 28. Suggestions for improvements (Lower Herbert)

Suggestions for improvement
No idea
Keep them coming
Can't see any significant improvements needed.
Shorter time frame for final payment
I think it works fine
Give growers more than 50/50 grant contribution
Don't make BMP a necessity for the grant because it puts growers off applying for it because of the BMP process.
Very happy, currently
Once project is complete and all criteria met, final payment should just be paid.
Nothing
No need to improve
Arrange payment to BMP accredited growers sooner

Q6. Which of the following statements best describes the impact of the grant you received?

When asked about the impact of the grant, a quarter (24%) of growers said they would not have adopted the practice without the grant, more than a third (36%) said they would probably have adopted the practice in the next three years and a third (28%) said they would probably have adopted the practice sometime in the future (more than three years) (Figure 19). Two growers (12%) said the grant enabled them to adopt the practice at a much larger scale than they would have otherwise.

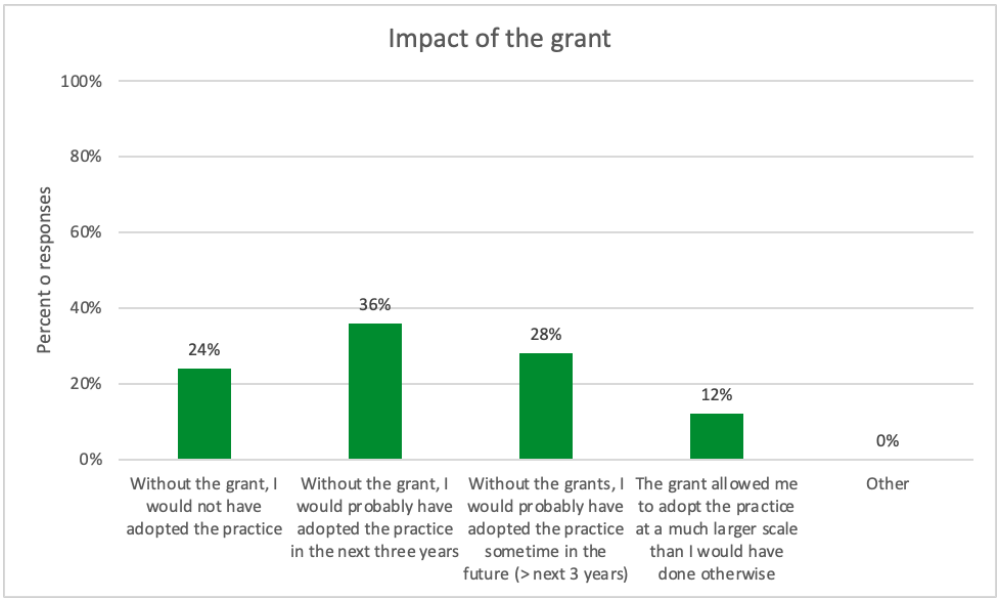

Figure 19. Impact of the grant (Lower Herbert)

Q7. How difficult do you think it will be to maintain the practice that the grant helped you with?

Most growers expect maintaining the practice to be very easy (60%) or easy (40%) (

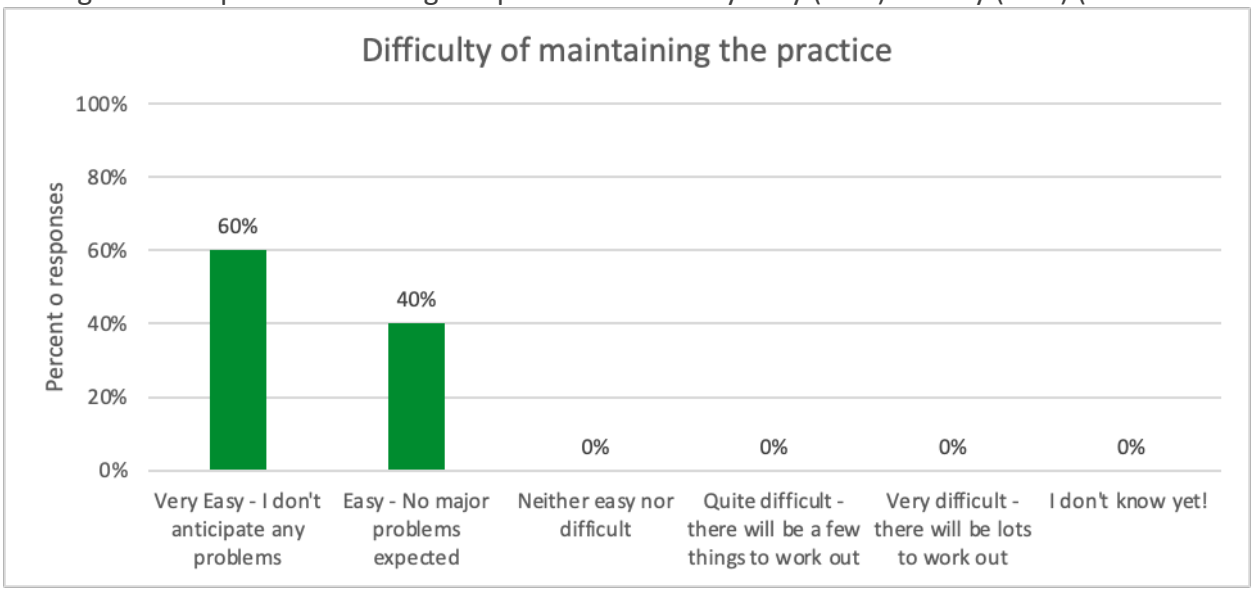

Figure 20). No growers felt that it was going to be at all difficult.

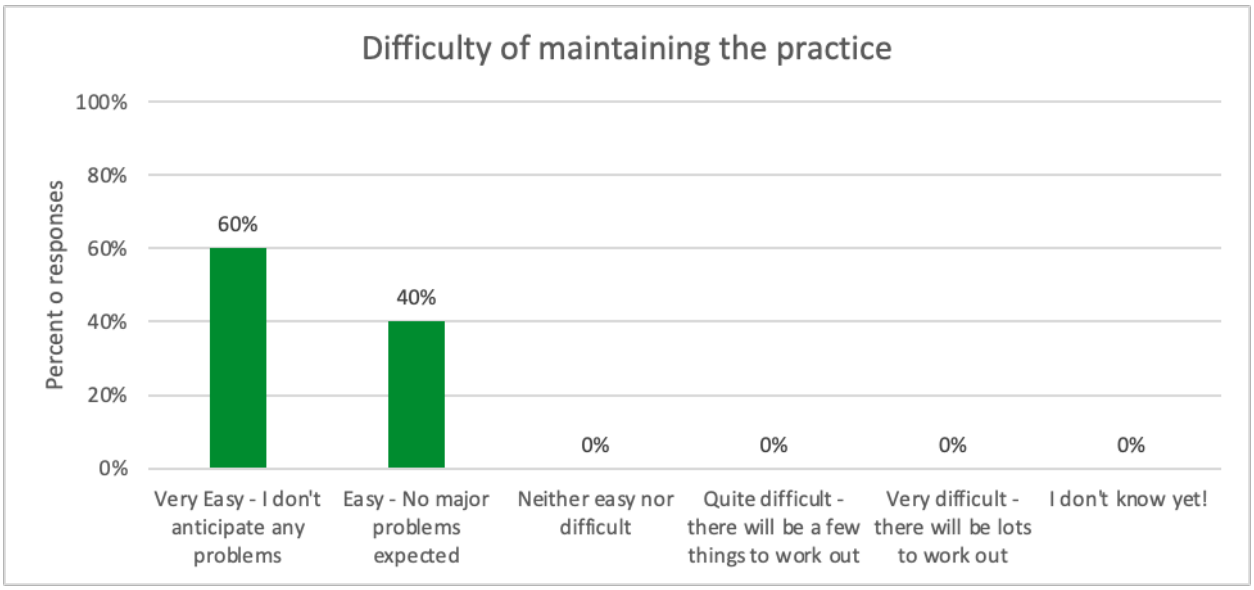

Figure 20. Difficulty in maintaining the practice (Lower Herbert)

What do you expect will be the biggest challenge in maintaining the practice?

Sixteen growers provided a response to this question (Table 29). The most common challenges listed were about learning the technology and/or upgrading it (25% of responses) or the weather (25%). Two growers mentioned maintenance costs, one mentioned the timing in relation to the season, and one mentioned product cost and availability. Forty-four percent said they did not anticipate any major challenges.

Table 29. Biggest challenges in maintaining the practice (Lower Herbert).

Biggest challenge to maintain the practice
Time. Depending on finish of season and reliability of mill.
No Challenge
Learning the technology
Equipment failure and upgrading of technology associated with the equipment. Cost to maintain the equipment.
I can't see anything at present
Mother Nature
Issues with rate controllers or GPS signals
Keeping up with the latest technology
Can't see that there will be any challenges. Have used already, very successfully.
To ensure it continues working as expected
Having suitable Weather to be able to plant a green manure cover crop
Weather and availability and cost of product
Very Easy - I don't anticipate any problems
Easy - No major problems expected
Very Easy - I don't anticipate any problems
Easy - No major problems expected

Q8. Are there any other comments you would like to make about the grant program?

Of the sixteen growers who provided additional comments, most (75%) made positive statements about the program and its benefits to the industry (31%) (Table 30). Two growers commented on the time delay between project completion and final grant payments, and one said it would be good to see more grants.

Table 30. Other comments from growers (Lower Herbert)

Final comments
Great opportunity for our local growers to get on board with good practices
Nothing further.
Simple, efficient and very helpful for new to the industry.
Great program for growers who would not afford to do projects without the funding
I would like to thank CANEGROWERS for all their help in the application process and helping me through BMP accreditation
I think this program is critical to bringing about practice change across the industry. It is essential that it continues and perhaps expands to involve facilitator collaboration and coaching for the growers who aren't yet involved. Helping them understand the processes and raising awareness of the benefits as learnt by those involved in early stages would be useful. Growers tend to listen to other growers and copy practices.
Yes, final payment should be forthcoming when commitment of equipment has been supplied, as all farming implements applied are meeting best farming practices already proven to make differences.

It would be good to see more grants for GPS in the future
Final payment should be made available as soon as project is completed, and milestones reach. Would just help financially as we have had to make payment to supplier.
Very grateful to have the opportunity to apply
The practice is easy to use and can see benefits of the practice change because of varied soil conditions.
Good program
Happy I was able to be involved
Great incentive

Appendix C: Grower survey results (Lower Burdekin)

At the time of preparing this report (June 2024), 32 grower surveys have been completed. All growers agreed to answer the survey questions. More than half of the growers surveyed (17 out of 32 growers) wanted to receive a summary of the survey results.

Q(C) What was the grant used for?

According to the survey answers, grants were mostly used for irrigation equipment (47% of growers). The balance of grants was used for Stoolzippas (25%) and precision agriculture equipment (25%). One survey reported soil management equipment (3%).

Q(D) What sort of practice will that improve?

Consistent with the equipment purchases described above, most (59%) grant projects in the Lower Burdekin region were for irrigation management. Other projects were for fertiliser management (53%), pesticide management (22%), runoff management (19%), herbicide management (13%) and tillage management (3%). Note that these categories are not exclusive – many surveys ticked two or more categories. For example, Stoolzippas contribute to fertiliser, herbicide and runoff management (although not all survey results are consistent in how they applied these categories).

Q1 Which age group do you belong to?

Growers surveyed in the Lower Burdekin were more mixed in age than the other regions (Lower Herbert, Mackay Whitsunday). Twenty-two percent were 65 or older, 28% were in the 55–64-year-old category, 19% were aged 45-54 years, 28% aged 35-44 years) and one grower (3%) in the 18-24 age group (Figure 21).

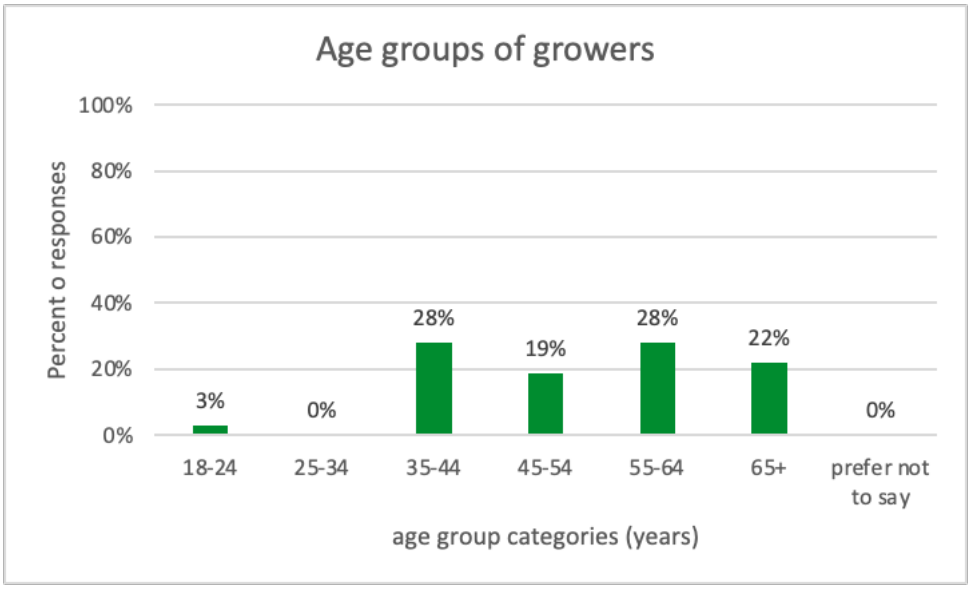

Figure 21. Age distribution of growers (Lower Burdekin)

Q2. Have you previously participated in a water quality program?

A quarter of growers (25%) surveyed said this was the first time they had participated in a water quality program (Figure 22). Over half (53%) had participated once or twice in previous water quality programs, and 13% had participated quite a few times (3 or more). A further 9% didn't know if they had previously participated in a water quality program.

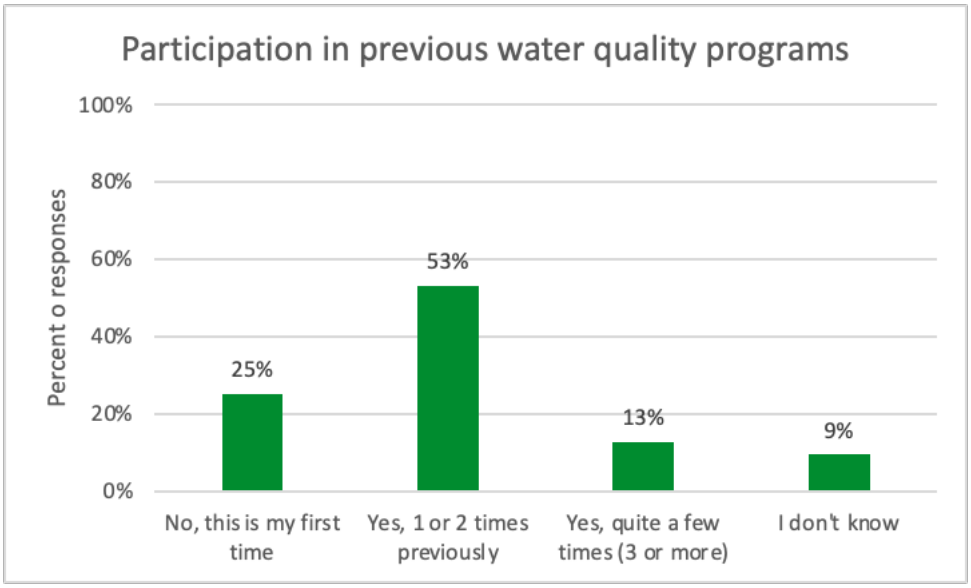

Figure 22. Participation in previous water quality programs (Lower Burdekin)

Q3. How did you hear about the grant program?

Most (81%) of the growers surveyed heard about the grant program direct from extension services such as Farmacist P/L, Agritech Solutions, Burdekin Productivity Services, SRA, Aglantis P/L or BBIFMAC (Figure 23). A further 9% heard from family members or another farmer, 3% from an industry newsletter or email, 3% from an event such as field day and 3% from NQ Dry Tropics.

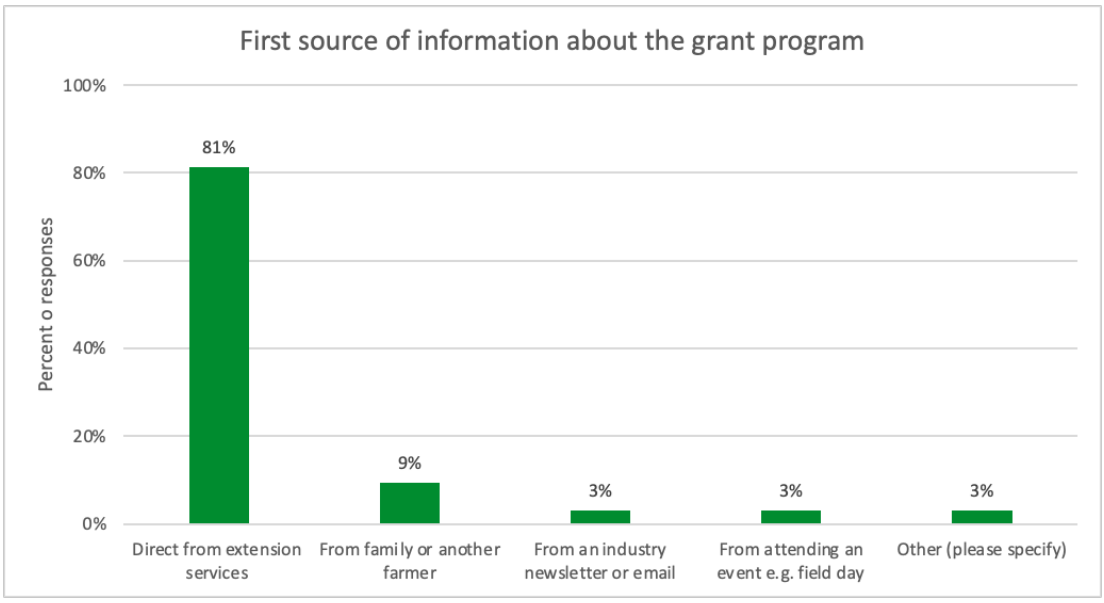

Figure 23. Where growers heard about the grant program (Lower Burdekin)

Q4. How did you find the process to apply for a grant?

Most growers found the process to apply for a grant very easy (50%) or quite easy (38%) (Figure 24). The balance said it was neither easy nor difficult (6%), or quite difficult (6%). No growers said it was very difficult to apply for a grant.

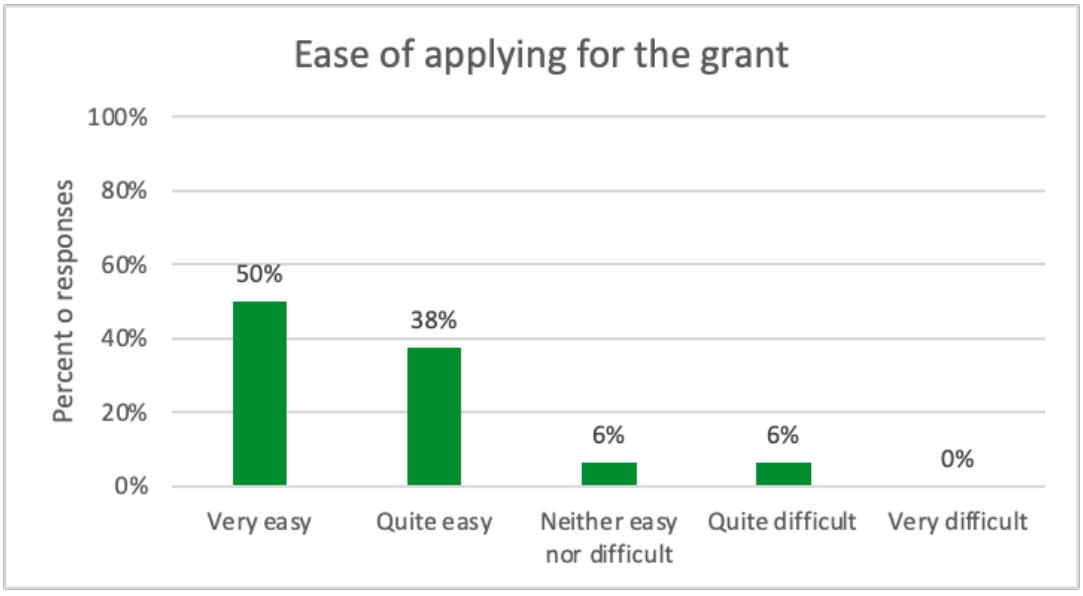

Figure 24. Ease of the grant application process (Lower Burdekin)

What did you find easy or difficult about the grant application process?

Of the 23 growers who provided comments about the grant application process, the most common comments were positive comments about help received with the application process (52% of comments), and that the process was easy (43%) (Table 31.) One comment said the process was difficult because of the information required and getting quotes. Other challenges included computer skills, contractors, time and research required, weather and data collection, and tweaks needed to some of the information provided.

Table 31. Comments on the ease of the grant application process (Lower Burdekin).

Comments about the grant application process
Level of involvement, Providing great information. Presentations.
A lot of support from Aglantis
All easy
Assistance from Aglantis in filling out forms and asking questions.
Difficult, the amount of research required to ensure the grant was applicable & getting quotes
Disgruntled contractors
Explanation of how the grant worked was thorough but easily understood.
Had assistance for application process
Initial meeting with SRA and Agritech solutions explained everything. Easy to Understand
Not most computer savvy, so some components needed assistance
Nothing difficult
Smooth sailing aside from weather drama meaning that some data might have needed re-collecting
SRA explained the application to us one on one. We understood the whole process
Support from Aglantis made the process easy.
The actual application process was strait forward
Thorough explanation. Process was followed as explained.
Time consuming, could be improved some
Transparency from SRA and ATS
Tweaks to the information need to provide, otherwise easy
very easy process, all parties worked together.
Whole process was easy
Working with the delivery providers
working with the groups involved it was excellent

Q5. How could we improve future grant programs? Any suggestions

Sixteen growers made suggestions for future grant programs (Table 32). Common comments related to grower engagement (39% of comments) including more field days and demonstration sites (4 comments), more face to face contact with delivery providers (1 comment) and more advertising (1 comment). The process to deliver the grants also attracted quite a few comments (33% of comments) including less paperwork or keeping the paperwork simple (3 comments), more suppliers (2 comments), technology integration (1 comment) and the timing of data collection with the start of plant cane (1 comment). Three people suggested more funds/larger grants, and two mentioned the knowledge base such as information about practices and environmental outcomes.

Table 32. Suggestions for improvements (Lower Burdekin)

Suggestions to improve future grant programs
% of grant, more money -> more smaller farmers. More information on environmental effect
Credible suppliers, experts in their field.
demonstration sites - farmer peer to peer
Developing the knowledge base. (Improving) Further progress to create a standard practice, rather than a mandated program. Volunteering Program (Self-regulatory) Growers have time to understand the changes
Easy as (keep the same), improve grower involvement to get most out of grant opportunities
Field days, Demonstrations with growers
Huge Savings water running out. 240 Huge savings (Demonstrations)
If paperwork pressure can be listed some to do so.
Keep the outlines as simple and clear as possible - easiest was for grower and people helping to fill out application know what is involved and if it is relevant to their property goals.
More advertising of the grant program and what will be involved
More Demonstration sites
More financial support
More money
More players in the market. Technology growth. Platform that captures all the other features/data/AI. Trying to convert the farm to a more corporate style farm. Farm will need to be automated and have more technology.
Not the most technology savvy, therefore keeping the record keeping simple or even more simple appreciated
Prior record keeping. Starting the process at the start of the cycle. (Plant cane)
Would like to see people face to face in future not just online through email or phone calls (ensuring all growers get to meet grant/funding coordinators)

Q6. Which of the following statements best describes the impact of the grant you received?

When asked about the impact of the grant, about a third (31%) of growers said they would not have adopted the practice, 16% said they would probably have adopted the practice in the next three years and another third (31%) said they would probably have adopted the practice sometime in the future (more than three years) (Figure 25). Fifteen percent said the grant enabled them to adopt the practice at a much larger scale than they would have otherwise.

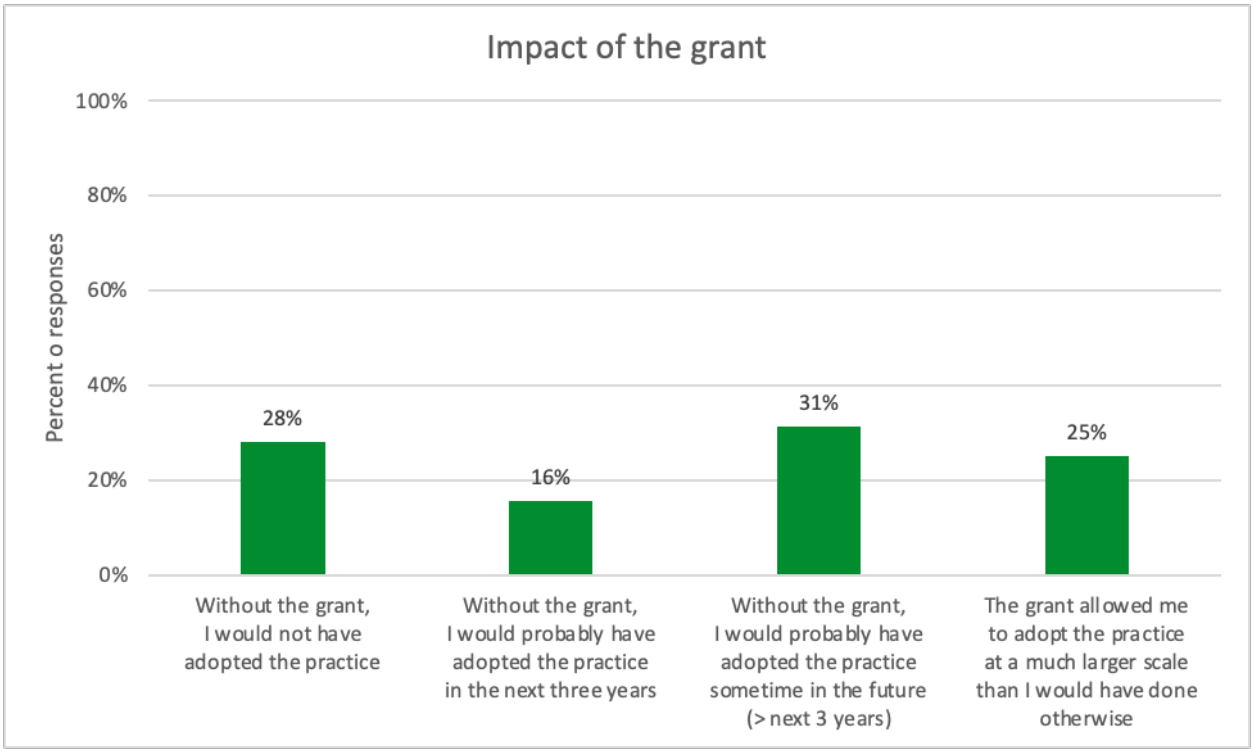

Figure 25. Impact of the grant (Lower Burdekin)

Q7. How difficult do you think it will be to maintain the practice that the grant helped you with?

Most growers expect maintaining the practice to be very easy (38%) or easy (47%) (Figure 26). A further 16% said it would be neither easy nor difficult to maintain the practice. No growers felt that it was going to be quite difficult or very difficult.

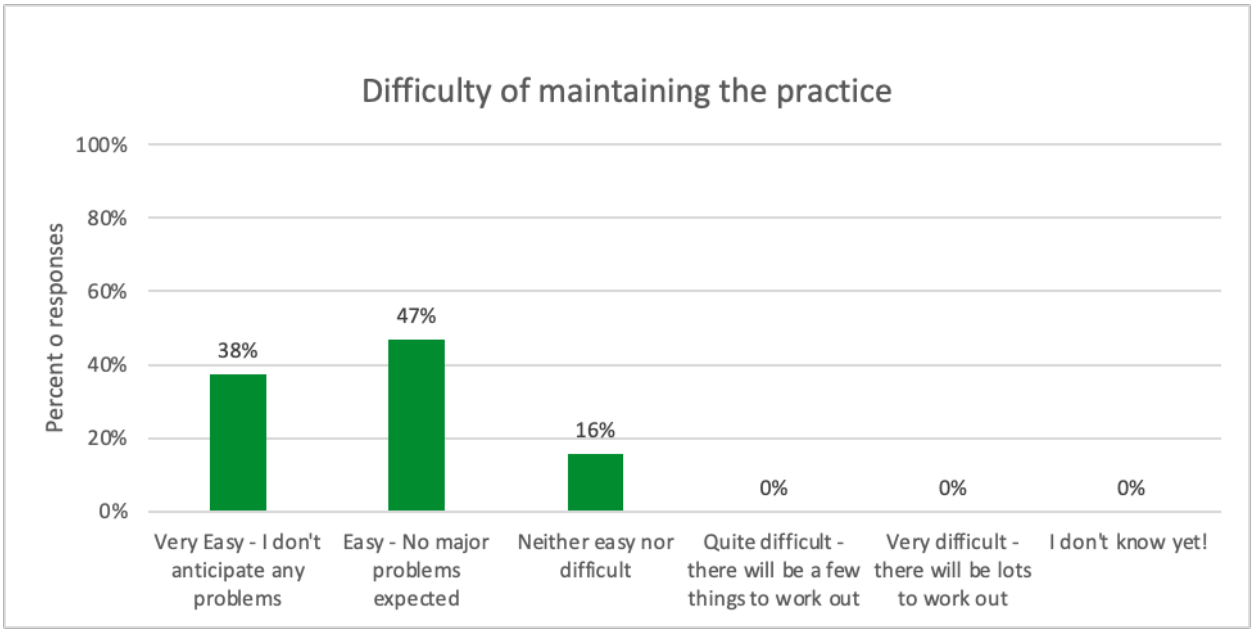

Figure 26. Difficulty in maintaining the practice (Lower Burdekin)

What do you expect will be the biggest challenge in maintaining the practice?

Only one response was recorded for this question "Ensuring data is not just used to make a report but is provided to the grower with attached recommendations/ solutions".

Q8. Are there any other comments you would like to make about the grant program?

Nine growers provided additional comments, eight of which were positive statements about the program, and appreciation of the support and funding (Table 33). The only other comment was about ensuring that data is used.

Table 33. Other comments from growers (Lower Burdekin)

Other comments
Appreciative of the financial assistance this opportunity provided
Ensure data is used not just left to the side
Financial aid to keep farm up to full potential is appreciated
Good communication with NQDT and good information available
Keep people informed to new opportunities and if funding support might be possible
Very good to have available grants/ people to assist
Very much appreciated, not expected (the money).
Would not have participated without assistance of third-party for the paperwork side of the grant application