



Australian Government



Queensland Government

Agricultural Land Management Practice Adoption

Methods

Reef Water Quality Report Card 2017 and 2018

Reef 2050 Water Quality Improvement Plan

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STEWARDSHIP – AGRICULTURAL MANAGEMENT PRACTICE ADOPTION METHODS

This report summarises the development of revised management practice benchmarks for the Reef 2050 Water Quality Improvement Plan (Reef 2050 WQIP) and how progress toward the plan's 2025 land management target for adoption of best practice is assessed.

The target for adoption of agricultural best management practice is as follows (Australian and Queensland governments, 2018):

- 90% of land in priority areas under grazing, horticulture, bananas, sugarcane and other broadacre cropping are managed using best management practice systems for water quality outcomes (soil, nutrient and pesticides).

Each year significant investment is directed towards the adoption of best practice farm management systems with the aim to achieve the Reef 2050 WQIP's outcome and targets and improve the quality of the water flowing into the Great Barrier Reef.

The effectiveness of these investments are monitored and reported on by the Paddock to Reef Integrated Monitoring, Modelling and Reporting Program (Paddock to Reef program).

The Stewardship – Agricultural management practice adoption program is a component of the Paddock to Reef program. It measures progress towards the Reef 2050 WQIP target for the adoption of agricultural best management practices and provides data to the [Catchment pollutant delivery – Catchment loads modelling program](#) component of the Paddock to Reef program so the impact of investment on water quality can be estimated.

Water quality risk frameworks

Best management practices for water quality outcomes are defined in Paddock to Reef program [water quality risk frameworks](#) for each major agricultural industry. These frameworks identify the farm management practices with the greatest potential to influence off-farm water quality and to articulate a reasonable best practice level which can be expected to result in a moderate-low risk to off-farm water quality.

For grazing systems, the water quality risk frameworks describe practices impacting upon land condition, soil erosion (pasture – hillslope, streambank and gully) and water quality. For sugarcane, horticulture, bananas and grains, the framework details management practices and systems for managing nutrients, pesticides and soils. Gathering this information across the landscape helps to prioritise areas which need greater support to improve landholders' management practices.

Practices in the water quality risk frameworks are described in terms of their relative water quality risk, which range from lowest to high. The 'best practice' and 'minimum standard' levels are typically the levels targeted by Reef 2050 WQIP investments. These levels generally align with the "Above Industry Standard" and "Industry Standard" levels described in industry BMP programs.

Industry-led BMP programs provide whole-of-business approaches to identifying potential farm management improvements across many areas, for example; land management, energy efficiency, animal welfare, biosecurity, and occupational health and safety. Whilst the industry programs include practices relevant to water quality risk and stewardship, this is not their only

focus. The water quality risk frameworks employed by the Paddock to Reef program describe only the farm practices that influence off-farm water quality.

Table 1. Water Quality Risk Frameworks for the Reef 2050 Water Quality Improvement Plan and alignment with the 'ABCD' terminology and industry best management practice (BMP) programs (generalised).

Terminology	Practice standard			
Water Quality Risk Framework	Lowest risk, commercial feasibility may be unproven	Moderate-low risk	Moderate risk	High risk
	Innovative	Best practice	Minimum Standard	Superseded
ABCD	A	B	C	D
Industry BMP programs (generalised)	Above industry standard (Typically aligns with moderate-low risk but in some instances aligns with lowest risk state.)	Above industry standard (Typically aligns with moderate-low risk but in some instances aligns with lowest risk state.)	Industry standard	Below industry standard

Importantly:

- The suites of practices relevant to each pollutant are described in the [water quality risk frameworks](#). Not all of the practices in the production system are described - only those practices with the greatest potential to influence off-farm water quality risk (i.e. through reducing the movement of sediments, nutrients or pesticides off-farm).
- The majority of these practices also present productivity and/or profitability enhancements.
- Not all practices are equal. The frameworks allocate a percentage weighting to each practice depending upon its relative potential influence on off-farm water quality.

Reef 2050 Water Quality Improvement Plan adoption benchmarks

Farm management practice adoption estimates were reviewed during 2016 and 2017 to establish realistic management practice adoption benchmarks in each sector, and also to align with updated water quality risk frameworks. The benchmark is regarded as a point-in-time assessment, nominally set as the 30 June 2016. Progress toward the Reef 2050 WQIP target is measured from the commencement of the 2016-2017 year.

Paddock to Reef program management practice and management system benchmarks have been developed for each agricultural industry sector, and in each major river basin within each region. Annual progress towards the Reef 2050 WQIP target for adoption is measured from these benchmarks. There are varying levels of uncertainty or confidence in these benchmarks for many reasons (see Table 2).

Table 2. Summary of data sources and uncertainty around management system benchmarks developed for the Reef 2050 WQIP.

Industry	Primary data sources	Confidence in benchmarks	Sources of uncertainty
Grazing	<ul style="list-style-type: none"> Grazier 1:1 surveys 2013-16 Previous reporting to Paddock to Reef program Grazing BMP* (aggregated, anonymous). 	Moderate – low	<p>Relatively small proportion of the overall large population is represented in the datasets.</p> <p>Inability to describe land condition (as a consequence of management) across the landscape.</p>
Horticulture	<ul style="list-style-type: none"> Hort360 BMP Industry experts. 	Moderate	Very good industry representation, however lack of alternative lines of evidence for cross checking.
Bananas	<ul style="list-style-type: none"> Previous reporting to Paddock to Reef program Industry experts Industry surveys Research, Development and Extension projects. 	Moderate –low	No discrete fit-for-purpose datasets available for some key practices, heavy reliance on sometimes divergent expert experience.
Sugarcane	<ul style="list-style-type: none"> Previous reporting to Paddock to Reef program Compliance reporting (reef protection legislation) Smartcane BMP (anonymous, aggregated) Industry surveys Soil analyses trends Industry experts Confidential commercial data. 	Moderate – High	Several different large and representative datasets providing evidence for most practices in most catchments. However, benchmarks for some practices are based on expert opinion (as no data sources exist).

Broad-acre cropping (Grains)	<ul style="list-style-type: none"> • Previous reporting to Paddock to Reef program • Industry experts • Grains BMP (anonymous, aggregated). 	Moderate	<p>No discrete fit-for-purpose datasets available for some practices.</p> <p>Expert experience sometimes divergent on some practices.</p>
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*BMP = best management practice

Assessing progress towards the Reef 2050 Water Quality Improvement Plan target

As described above, the agricultural management practice adoption benchmarks were updated for each of the management practices, for each agricultural industry, each region and each river basin. These are reviewed and revised every five years, whereas annual changes from the benchmark are based on management practice data reported each year. Delivery organisations involved in Reef 2050 WQIP investment programs collect spatial and management practice adoption data throughout the year and deliver it to a central repository to generate the dataset of improved adoption. For the purpose of describing industry status and progress towards the practice adoption target, best management practice is defined as the summed area managed under lowest and moderate-low risk (or 'A and B' practice) levels in each catchment.

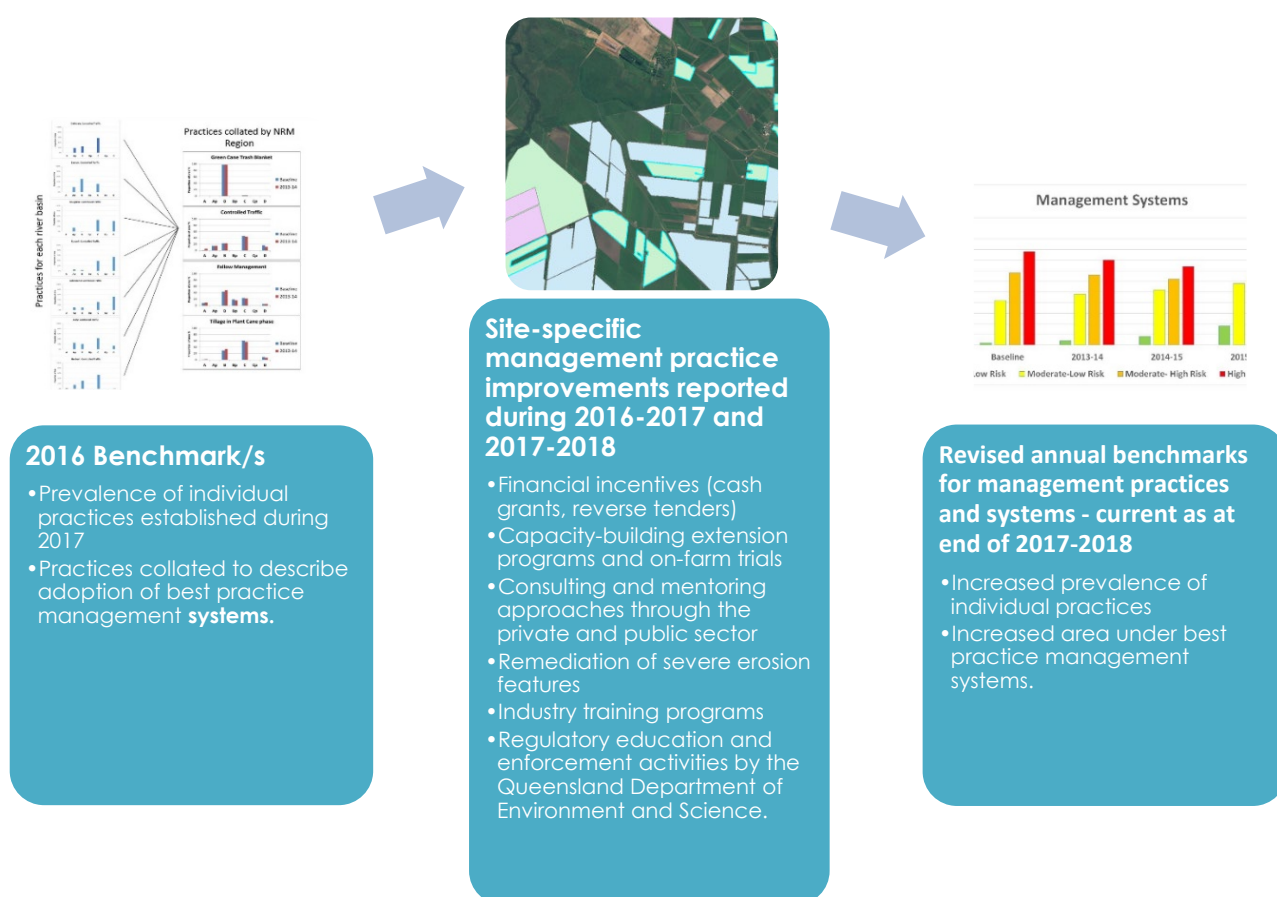


Figure 1. The process for monitoring benchmarks and management practice improvements.

Evidence of management practice change


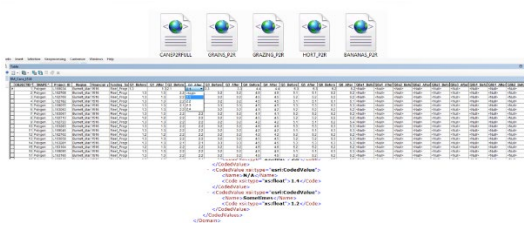

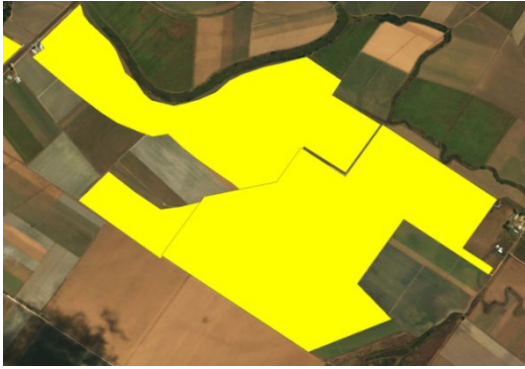
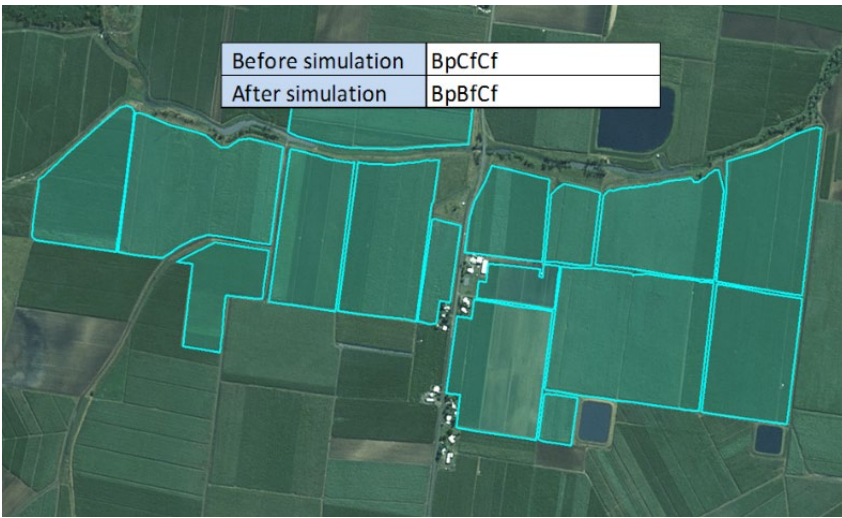
Progress of adoption of improved practices and best management practice systems is monitored over time. Organisations that receive funding from Reef 2050 WQIP programs for the purpose of increasing the adoption of best management practice, are required to report the impacts of their programs and projects as per the relevant industry water quality risk framework. The 'interventions' reported and assessed through these programs and projects (Table 3) for the Reef Water Quality Report Card 2017 and 2018 include:

- Financial incentives (direct grants and tenders)
- Capacity-building extension programs and on-farm trials
- Consulting and mentoring approaches through the private and public sector
- Remediation of severe erosion features
- Industry training programs
- Regulatory education and enforcement activities by the Queensland Department of Environment and Science (DES).

Organisations must provide accurate spatial data and farm management attributes according to a schema provided by the Paddock to Reef program. The management practice attributes include a 'before the intervention' assessment, and an 'after the intervention' assessment, that identifies which practice/s have changed as a result of the intervention. In this way, an adoption profile is created and maintained for specific land parcels. These data are subject to strict privacy limitations (according to the *Information Privacy Act 2009*) and are not provided to anyone for any purpose other than modelling estimated water quality improvements. Access to these data is restricted and possible only by a team of four officers in the Queensland Department of Agriculture and Fisheries (DAF).

The limitations with this approach are:

- Management change is identified where and when it is reported to have occurred. This relies on delivery organisations sensibly and appropriately reporting on their activities and the impacts of those activities. The Paddock to Reef program describes and reports on the impacts of change for which there is reasonable and sensible justification. It is important to note however that in most cases it is not possible for the Paddock to Reef program to verify that reported improvements have occurred and/or the true extent to which they have occurred. This has resulted in instances of *overstatement* of adoption in previous years.
- Management improvements that occur without the intervention of third party delivery organisations are rarely detected as there are no industry-wide mechanisms for capturing or reporting management practice change. There is likely to be a degree of *underestimation* of improvements for this reason. The five-year benchmarks endeavour to capture management state on this broader scale but the intervening periods are reliant on reported changes.
- Any regression of practices (i.e. adopting practices that increase water quality risk) is difficult to detect as these are unlikely to be reported. However, the approach can appropriately reflect regression if necessary. For this reason, it is possible that the degree of adoption at a catchment scale may be *overstated*.

		Delivery organisations provide annual evidence of impact to the Paddock to Reef program, in the form of GIS data and detailed management practice data (as coded responses to questions based on the water quality risk frameworks).				
	<p>A sugarcane farm is reported at the lowest risk management state for nitrogen fertiliser use in 2015-2016.</p>	<p>The data is reviewed on a site-by-site basis to provide assurance that reporting towards adoption targets and modelled pollutant load reductions is sensible. This review includes:</p> <ul style="list-style-type: none">identifying data handling errorschecking that the nature of the intervention aligns with the reported impact				
	<p>The same sugarcane farm is reported at the highest risk management state for nitrogen fertiliser in 2016-2017. Identifying spatial and temporal conflicts is essential to ensure that impacts are sensible and not captured more than once.</p>	<ul style="list-style-type: none">checking that the degree of impact (farm management change) is sensible and realistic, including checking that the reported impacts correspond with other independent lines of evidence available to the Paddock to Reef programchecking that individual sites and impacts on those sites have not previously been reported to the Paddock to Reef program and included in estimates of progress towards Reef Water Quality Protection Plan targets.				
 <table data-bbox="346 1485 786 1554"><tr><td>Before simulation</td><td>BpCfCf</td></tr><tr><td>After simulation</td><td>BpBfCf</td></tr></table>		Before simulation	BpCfCf	After simulation	BpBfCf	<p>For every site (usually a paddock or farm) the management regime and how it is has changed is aligned to modelling simulations which best represent that management (as 'before' and 'after' simulations). The example (left) codifies the trash management, machinery traffic and tillage regime, nutrient rates and timing, and weed management on a sugarcane farm.</p> <p>Data provided annually to Paddock to Reef catchment modelling constitutes layers that describe change in this way for many hundreds of individual sites.</p>
Before simulation	BpCfCf					
After simulation	BpBfCf					

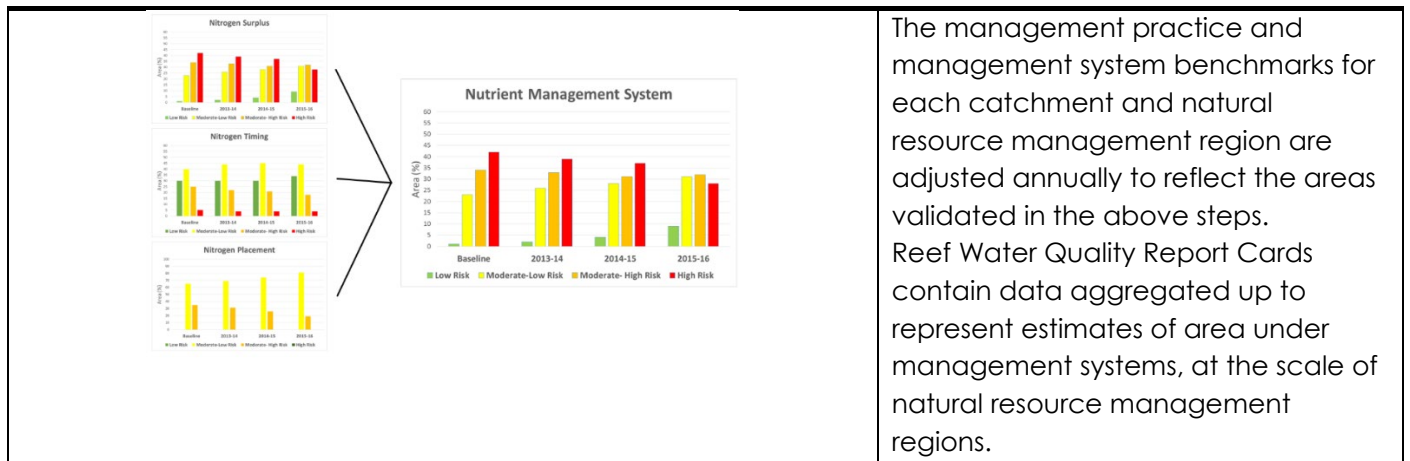


Figure 2. The broad process for evaluating impacts reported by organisations through the Reef 2050 WQIP.

A summary of the projects and programs that reported on-ground impact for the 2016-2017 and 2017-2018 years is presented in Table 3. The total spatial extent reported to the Paddock to Reef program is sometimes different to the spatial extent utilised by the Paddock to Reef program in modelling for average annual pollutant load reductions. This can be for several reasons:

- Different projects operating in the same catchment can have some overlaps and this is to be expected. However the impacts can only be described in the Reef Water Quality Report Card once.
- Insufficient evidence for the Paddock to Reef program to include reported impacts in the Reef Water Quality Report Card results.
- Some of the reported management practice improvements may be too small to be reflected as management system improvements in the modelling of average annual pollutant load reductions.

Table 3. Program and project investments reviewed for Reef Water Quality Report Card 2017 and 2018.

Natural resource management region	River Basin	Commodity	Program	Total reported spatial extent of <i>practice change</i> reviewed for Reef Water Quality Report Card 2017 and 2018 (ha or km of stream)		Corrected spatial extent utilised in determining progress toward Reef 2050 WQIP targets for adoption and water quality	
				2016-2017	2017-2018	2016-2017	2017-2018
Burnett Mary	Mary	Grazing	Aus. Government Reef Trust III – Reef Alliance	-	510ha	-	510ha
				-	5km	-	5km
	Baffle	Grazing	Aus. Government Reef Trust III – Project Pioneer	3,091ha	-	3,091ha	-
	Burnett	Grazing	Qld Government Department of Natural Resources and Mines (DNRME) Sustainable Agriculture Project	696ha	-	665ha	-
			Aus. Government National Landcare Program (NLP) - Better Catchments	-	719ha	-	719ha
			Qld Government DNRME Queensland Regional Natural Resource Management (QNRM) Program	-	172ha	23 ¹ ha	171ha
			Aus. Government Reef Trust III – Reef Alliance	-	1,353ha	-	1,320ha
				-	3km	-	3km
			Aus. Government Reef Trust III – Project Pioneer	7,042ha	-	7,042ha	-
		Grains	Aus. Government NLP – Better Catchments	-	1,555ha	-	306ha
		Sugarcane	Aus. Government Reef Trust III – Reef Alliance	-	229ha	-	229ha
	Burrum	Sugarcane	Aus. Government Reef Trust III – Reef Alliance	163ha	65ha	163ha	65ha
Fitzroy	Calliope	Grazing	Qld Department of Agriculture and Fisheries (DAF) Extension	-	273ha	-	273ha

¹ This change is the result of a project undertaken on a property in the Dawson catchment, of which 23ha fell into the Burnett catchment boundary.

Natural resource management region	River Basin	Commodity	Program	Total reported spatial extent of <i>practice change</i> reviewed for Reef Water Quality Report Card 2017 and 2018 (ha or km of stream)		Corrected spatial extent utilised in determining progress toward Reef 2050 WQIP targets for adoption and water quality	
				2016-2017	2017-2018	2016-2017	2017-2018
	Comet	Grazing	Qld Government DNRME QNRM Program	1,417ha	-	1,411ha	-
			Qld Government DAF Extension	-	282ha	-	282ha
	Dawson	Grazing	Qld Government Reef Trust I – Saving our Soils	-	10ha	-	10ha
			Aus. Government Reef Trust II – Gully Remediation	-	4,258ha	-	4,255ha
			Aus. Government Reef Trust III – Project Pioneer	-	55ha	-	-
			Qld Government DNRME QNRM Program	3,581ha	-	3,581ha	-
				8km	-	8km	-
			Qld Government DAF Extension	-	34,730ha	-	34,730ha
	Isaac	Grazing	Qld Government DAF Extension	107,296ha	4,666ha	107,296ha	4,666ha
			Qld Government Reef Trust I – Saving our Soils	-	4,362ha	-	3,446ha
			Aus. Government Reef Trust II – Gully Remediation	451ha	1,567ha	451ha	1,121ha
				7km	-	7km	-
			Qld Government DNRME QNRM Program	-	2,671ha	-	2,685 ² ha
				4km	5km	4km	5km
	Fitzroy	Grazing	Qld Government DNRME QNRM Program	338ha	3ha	338ha	3ha
			Aus. Government System Repair	693ha	-	676ha	-
				2km	-	2km	-
			Qld Government Reef Trust I – Saving our Soils	-	18,033ha	-	14,188ha

² This figure is larger than the total reported spatial figure due to projects undertaken on properties in Mackay Whitsunday region overlapping the Fitzroy region (Isaac River catchment) boundaries.

Natural resource management region	River Basin	Commodity	Program	Total reported spatial extent of <i>practice change</i> reviewed for Reef Water Quality Report Card 2017 and 2018 (ha or km of stream)		Corrected spatial extent utilised in determining progress toward Reef 2050 WQIP targets for adoption and water quality	
				2016-2017	2017-2018	2016-2017	2017-2018
	Mackenzie	Grazing	Aus. Government Reef Trust II – Gully Remediation	156ha	586ha	156ha	535ha
			Qld Government DAF Extension	2,952ha	25,091ha	2,952ha	25,090ha
			Qld Government Reef Trust I – Saving our Soils	-	11,519ha	-	10,608ha
				-	2km	-	2km
	Nogoa	Grazing	Aus. Government Reef Trust II – Gully Remediation	-	161ha	-	45ha
			Qld Government DAF Extension	-	70ha	-	70ha
			Qld Government DNRME QNRM Program	1,771ha	-	1,771ha	-
				1km	-	1km	-
	Styx	Grazing	Aus. Government Reef Trust II – Gully Remediation	603ha	1,615ha	603ha	1,615ha
			Qld Government Reef Trust I – Saving our Soils	-	4,153ha	-	3,671ha
Mackay Whitsundays	O'Connell	Sugarcane	Qld Government DAF Extension	15ha	-	15ha	-
			Aus. Government Reef Trust III – Reef Alliance	-	2,243ha	-	2,243ha
		Grazing	Qld Government DAF Extension	806ha	-	806ha	-
			Aus. Government Reef Trust III – Reef Alliance	1,486ha	-	1,486ha	-
			Qld Government DNRME QNRM Program	17ha	1,090ha	17ha	1,090 ³ ha
				24km	5km	24km	5km
	Pioneer	Grazing	Qld Government DAF Extension	7,214ha	-	7,211ha	-
			Qld Government DNRME QNRM Program	19ha	24ha	19ha	24ha

³ This figure is larger than the total reported spatial figure due to projects undertaken on properties in Mackay Whitsunday region overlapping the Fitzroy region (Isaac River catchment) boundaries.

Natural resource management region	River Basin	Commodity	Program	Total reported spatial extent of <i>practice change</i> reviewed for Reef Water Quality Report Card 2017 and 2018 (ha or km of stream)		Corrected spatial extent utilised in determining progress toward Reef 2050 WQIP targets for adoption and water quality	
				2016-2017	2017-2018	2016-2017	2017-2018
	Plane Creek	Sugarcane	Aus. Government Reef Trust III – Reef Alliance	10km	-	10km	-
			Qld Government DAF Extension	-	1,874ha	-	1,874ha
		Sugarcane	Qld Government DAF Extension	12ha	-	12ha	-
			Aus. Government Reef Trust III – Reef Alliance	-	6,380ha	-	6,380ha
		Grazing	Qld Government DAF Extension	2,250ha	-	2,246ha	-
			Qld Government DNRME QNRM Program	20ha	326ha	20ha	326ha
				1km	1km	1km	1km
		Grazing	Qld Government DNRME QNRM Program	11ha	740ha	11ha	740ha
				-	2km	-	2km
			Aus. Government Reef Trust III – Reef Alliance	466ha	-	466ha	-
Burdekin	Bowen	Grazing	Qld Government DAF Extension	22,270ha	1,195ha	22,270ha	1,195ha
			Aus. Government Reef Trust III – Gully Remediation	59ha	-	59ha	-
			Aus. Government Reef Trust III – Reef Alliance	2,597ha	3,544ha	2,597ha	3,544ha
			Qld Government DNRME QNRM Program	12ha	-	12ha	-
	Don	Horticulture	Qld Government DAF Extension	-	79ha	-	79ha
		Grazing	Aus. Government Reef Trust III – Project Pioneer	171ha	-	171ha	-
			Aus. Government Reef Trust III – Reef Alliance	28,772ha	3,680ha	28,772ha	3,638ha
			Aus. Government Greening Australia Sediment Project	-	262ha	-	262ha
			Qld Government DAF Extension	-	9,049ha	-	8,977ha
	Haughton	Horticulture	Qld Government DAF Extension	-	44ha	-	44ha

Natural resource management region	River Basin	Commodity	Program	Total reported spatial extent of <i>practice change</i> reviewed for Reef Water Quality Report Card 2017 and 2018 (ha or km of stream)		Corrected spatial extent utilised in determining progress toward Reef 2050 WQIP targets for adoption and water quality	
				2016-2017	2017-2018	2016-2017	2017-2018
		Grazing	Aus. Government Reef Trust III – Project Pioneer	12,894ha	-	12,801ha	-
			Aus. Government Reef Trust III – Reef Alliance	8,691ha	24,704ha	8,691ha	24,649ha
				19km	11km	14km	11km
		Sugarcane	Aus. Government Reef Trust II – Reverse Tender	-	866ha	-	866ha
			Aus. Government Reef Trust III – Reef Alliance	-	2,096ha	-	2,096ha
			Qld Government DES RP161 Program	3,668ha	5,560ha	3,668ha	5,560ha
	Lower Burdekin	Grazing	Aus. Government Reef Trust III – Reef Alliance	8,204ha	13,468ha	7,161ha	13,468ha
				10km	20km	10km	20km
			Aus. Government Reef Trust III – Gully Remediation	5ha	-	5ha	-
			Aus. Government Reef Trust III – Project Pioneer	32,159ha	-	32,159ha	-
			Qld Government (NESP 3.1.7) Innovative Gully Remediation Strathalbyn	-	58ha	-	58ha
			Qld Government DAF Extension	54,320ha	-	54,302ha	-
		Sugarcane	Aus. Government Reef Trust II – Reverse Tender	-	1,451ha	-	1,451ha
			Aus. Government Reef Trust III – Reef Alliance	-	3,341ha	-	3,341ha
			Qld Government RP161	2,285ha	2,854ha	2,285ha	2,854ha
	Suttor	Grazing	Aus. Government Reef Trust III – Project Pioneer	132,999ha	-	107,023ha	-
			Qld Government DAF Extension	511,100ha	79,544ha	509,702ha	79,395ha
	Upper Burdekin	Grazing	Aus. Government Reef Trust I – Saving our Soils	4,292ha	8,459ha	4,292ha	7,870ha
			Aus. Government Reef Trust III – Project Pioneer	71,063ha	-	62,602ha	-

Natural resource management region	River Basin	Commodity	Program	Total reported spatial extent of <i>practice change</i> reviewed for Reef Water Quality Report Card 2017 and 2018 (ha or km of stream)		Corrected spatial extent utilised in determining progress toward Reef 2050 WQIP targets for adoption and water quality	
				2016-2017	2017-2018	2016-2017	2017-2018
Wet Tropics			Aus. Government Reef Trust III – Reef Alliance	51,946ha	75,318ha	29,074ha	70,968ha
				82km	45km	82km	11km
			Qld Government DAF Extension	2,293ha	50,386ha	2,293ha	37,450ha
	Johnstone	Sugarcane	Qld Government DAF Extension	-	59ha	-	59ha
			Qld Government DES RP163 Protecting our Chemicals (Sugar Research Australia - SRA)	2,693ha	-	2,693ha	-
			Qld Government DES Reef compliance program	-	62ha	-	62ha
			Aus. Government Reef Trust IV – Reverse Tenders	-	3,317ha	-	3,317ha
	Barron	Bananas	Aus. Government Reef Trust III – Reef Alliance	200ha	-	200ha	-
		Bananas	Aus. Government Reef Trust III – Reef Alliance	48ha	-	48ha	-
		Sugarcane	Qld Government DAF Extension	-	898ha	-	898ha
			Qld Government DES – RP163 Protecting our Chemicals (SRA)	-	428ha	-	428ha
		Horticulture	Qld Government DAF Extension	-	24ha	-	24ha
		Grains	Aus. Government Reef Trust III – Reef Alliance	-	35ha	-	-
	Tully	Bananas	Aus. Government Reef Trust III – Reef Alliance	-	28ha	-	28ha
		Sugarcane	Qld Government DES – RP163 Protecting our Chemicals (SRA)	-	1,950ha	-	1,950ha
			Qld Government DES – TF11.9 Cane to Creek (Sugar Research Australia)	-	30ha	-	30ha
			Aus. Government Reef Trust IV – Reverse Tenders	-	77ha	-	77ha
		Sugarcane	Qld Government DAF Extension	1,890ha	-	1,890ha	-

Natural resource management region	River Basin	Commodity	Program	Total reported spatial extent of <i>practice change</i> reviewed for Reef Water Quality Report Card 2017 and 2018 (ha or km of stream)		Corrected spatial extent utilised in determining progress toward Reef 2050 WQIP targets for adoption and water quality	
				2016-2017	2017-2018	2016-2017	2017-2018
	Mulgrave-Russell		Qld Government DES – RP163 Protecting our Chemicals (SRA)	-	3,639ha	-	3,63 ha
			Qld Government DES – TF11.9 Cane to Creek (SRA)	-	3,624ha	-	3,624ha
			Aus. Government Reef Trust IV – Reverse Tenders	-	674ha	-	674ha
		Bananas	Aus. Government Reef Trust III – Reef Alliance	-	42ha	-	42ha
		Sugarcane	Aus. Government Reef Trust IV – Reverse Tenders	-	906ha	-	906ha
	Murray	Sugarcane	Qld Government DES – RP163 Protecting our Chemicals (SRA)	-	627ha		627ha
			Aus. Government Reef Trust IV – Reverse Tenders	-	310ha	-	310ha
	Herbert	Sugarcane	Qld Government DES Reef compliance program	-	409ha	-	409ha
		Grazing	Aus. Government Reef Trust III – Reef Alliance	-	4ha	-	4ha
Cape York	Normanby	Bananas	Aus. Government Reef Trust III – Reef Alliance	444ha	-	444ha	-
		Grazing	Aus. Government Reef Trust II – Gully Prevention & Remediation (Kings Plains Project)	41,472ha	-	41,468ha	-
			Aus. Government Reef Trust III – Reef Alliance	-	14,951ha	-	14,951ha
			Qld Government DES - On Ground Works – Springvale	-	59,256ha	-	59,256ha
	Endeavour	Grazing	Aus. Government Reef Trust II – Gully Prevention & Remediation (Kings Plains Project)	2,767ha	-	2,767ha	-

Describing progress

Management practices that are at the moderate-low risk (B) and lowest risk (A) levels are considered as 'best management practices'. These are summed in describing the proportion of total area in a catchment that is managed under best practice, and practices are combined according to their weightings to describe 'best management practice systems'. Colour coding based on five categories (Table 4) is also used to indicate progress toward the 90% adoption target.

Table 4. Colour-coded scoring system used to indicate progress.

Adoption progress – scoring system		
0–22%	E – Red	Very poor
23–45%	D – Orange	Poor
46–67%	C – Yellow	Moderate
68–89%	B – Light green	Good
90–100 %	A – Dark green	Very good

Qualitative confidence rankings



A multi-criteria analysis has been used to qualitatively score the confidence in each indicator used in the Reef Water Quality Report Card from low to high. The approach combined expert opinion and direct measures of error for program components where available.

References

Australian and Queensland governments 2018, Reef 2050 Water Quality Improvement Plan 2017-2022, <<https://www.reefplan.qld.gov.au/about/>>.

Further reading

McCosker K, Northey A 2015, 'Paddock to reef: Measuring the effectiveness of large scale investments in farm management change', *Rural Extension & Innovation Systems Journal*, vol.11, pp. 177-184.

Glossary

Adoption: In this context adoption is the process of changing how something is done on farms. Adopting a new farm management practice usually requires the acquisition of new knowledge and skills, and often new or different farm equipment and infrastructure. The extent to which a specific practice is adopted (adoption rate) is described as a percentage of the overall population or area. For example, 98% of the sugarcane growing area in the Johnstone River catchment retains harvested crop residues on the soil surface.

Benchmark: A value set at a reference point in time. In this context benchmarks are describing farm practice adoption rates at specific points in time. For example, the 2016 benchmark for

low-risk usage regime of residual herbicides in sugarcane in the Burdekin River catchment is 67% of the sugarcane growing area.

Best management practice systems: Farms are managed using many different management practices. There is a “best practice” level for each of these practices. The farm management **system** is a complex blend of all of these practices. Achieving a best management practice system means that all, or the majority of the constituent practices, are occurring at the best practice level. In the context of the Reef 2050 WQIP, the management systems described are best practice for off-farm water quality.

Industry best management practice program: In Queensland, each major agricultural industry sector leads a voluntary program that assists landholders to benchmark their current practices against an industry-developed set of standards. These standards are available for all aspects of farm business management, including the many of elements that are relevant when considering risks to off-farm water quality. Industry BMP programs operating in Great Barrier Reef catchments during 2016-2017 and 2017-2018 included:

- Sugarcane: Smartcane BMP (Queensland Cane Growers Organisation)
- Bananas: Banana BMP Guide (Australian Banana Growers Council)
- Beef cattle grazing: Grazing BMP (AgForce Queensland)
- Grains: Grains BMP (AgForce Queensland)
- Horticulture: Hort360 (Growcom)

Stewardship: Stewardship is the responsibility of carefully managing something. In the context of the Reef 2050 WQIP, it involves implementing or supporting farm practices that reduce sediment, nutrients, and pesticide pollution.