

QUEENSLAND REEF WATER QUALITY



© Tourism and Events Queensland.

Queensland Government Annual Investment Report 2017–2018

Reef 2050 Water Quality Improvement Plan



#31771

Contents

Introduction	3
Program investment.....	5
Measuring success	5
Funding categories	5
Investment tables	6

Introduction

The Queensland Reef Water Quality Program (QRWQP) is the Queensland Government's key response to addressing water quality impacts affecting the Great Barrier Reef. It delivers activities as part of implementing the Reef 2050 Water Quality Improvement Plan 2017–2022 (Reef 2050 WQIP) which supports the water quality theme of the Reef 2050 Long-Term Sustainability Plan (Reef 2050 Plan).

In 2017–2018, a new Five Year Investment Plan 2017–2018 to 2021–2022 was developed outlining the delivery of the Queensland Reef Water Quality Program. Part A of the five year investment plan describes the key areas of investment as they align to the actions under the Reef 2050 WQIP. Part B is a table that sets out the activities and corresponding investment amounts across the Queensland Reef Water Quality Program. Both documents can be accessed at www.qld.gov.au/environment/coasts-waterways/reef/reef-program.

This annual report covers activities and investments for the 2017–2018 period.

The Office of the Great Barrier Reef (OGBR) in the Department of Environment and Science (DES) is responsible for overseeing the Queensland Reef Water Quality Program, working with the other DES Divisions, the Departments of Natural Resources, Mines and Energy (DNRME) and Agriculture and Fisheries (DAF).



Program investment

The Five Year Investment Plan 2017–2018 to 2021–2022 detailed \$63,990,043 to deliver projects and activities in 2017–2018. During the 2017–2018 year, \$43,373,717 was expended across the program.

A number of multi-year programs and projects began in the mid to late 2017–2018 financial year, with some funds contracted but not expended during the year. Planned 2017–2018 investment against actual expenditure is shown in the investment tables following. Any unspent funds will be carried into future investment.

The QRWQP Investment Plan for 2018–2019 will detail the planned investment for the 2018–2019 financial year.

Measuring success

The program was delivered through two work areas, aligning to the structure of the Reef 2050 WQIP : Responding to the challenge, and Enabling delivery (see Figure 1). The investment tables following, report activity progress against these areas.

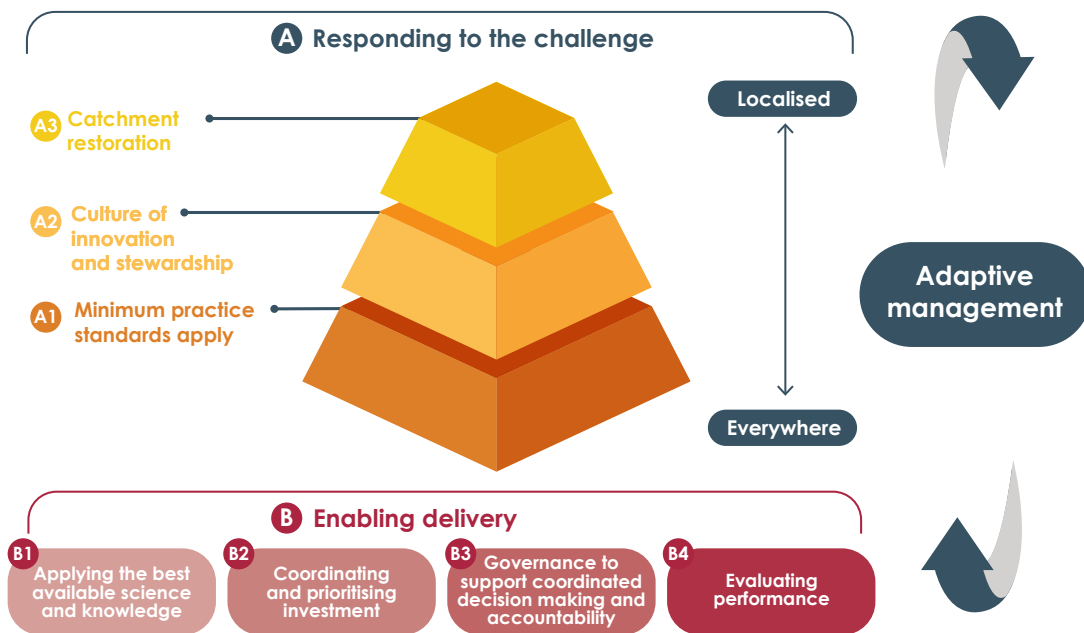


Figure 1: Implementing Reef 2050 WQIP

(Reference: 2018, State of Queensland, Reef 2050 Water Quality Improvement Plan 2017–2022 www.reefplan.qld.gov.au/about/)

Funding categories

Annual: Queensland Government annual funding

Additional: Additional funding over five years, supporting the Great Barrier Reef Water Science Taskforce recommendations

Co-contributions: Includes funding from either:

- an existing departmental program that supports Reef water quality work;
- as part of a broader state program where funding can be clearly separated into Reef regions; or
- as part of a state program where an approximate funding allocation is made for Reef regions achieving Reef 2050 WQIP targets.

Please note the following **correction** from the Queensland Government Annual Investment Report 2016–2017—eReefs expenditure should have been recorded as \$1 million (not \$969,652) and the Compliance program investment should have been reported as \$969,652 (not \$1 million).

Investment tables

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
Responding to the challenge: actions to progress towards targets							
Minimum practice standards							
Implement minimum practice standards for all relevant agricultural industries, which can be met either voluntarily, e.g. through industry-led best management practice (BMP) programs, or as a result of regulation.	Support to voluntary industry-led BMP programs in cane, grazing, grains, and banana industries, including continual improvement of BMP modules, benchmarking of producer's operations and accreditation to industry standard. Future support for BMP in horticultural industries is proposed.	\$7,770,000	\$3,179,113	Annual	DES	<p>The QRWQP supports voluntary, industry-led BMP programs for cane, grazing, banana and grains to assist producers identify practices that improve long-term productivity, profitability and sustainability of their enterprise.</p> <p>Other activities include development of management practice standards, partnership projects to demonstrate improved practices, and support to align state and federal government programs for nutrient use efficiency, sediment and pesticide land management improvements.</p> <p>The main cause (55%) of the underspend was due to Smartcane BMP not achieving accreditation targets over two years resulting in a surplus of funds for accreditation. This has been addressed in the next phase.</p> <p>The remaining 45% of underspend was due to delays caused by:</p> <ul style="list-style-type: none"> » Industry relationships impacted by vegetation management laws and proposed Reef regulations causing failure of industry to deliver some project outcomes or meet milestones. » Impacts of Tropical Race 4 (TR4) on banana farms and a lack of capacity of industry to undertake the planned work. 	<p>Land managed under the BMP across Reef catchments has increased over the past year.</p> <ul style="list-style-type: none"> » At the end of June 2018, the area of land that has been benchmarked in Reef catchments under Smartcane BMP is approximately 71% (283,622ha); the area under Grazing BMP is approximately 47% (13,404,407ha); and the area under Grains BMP is 16.8% (171,801ha). » Numbers of growers and producers participating in the BMP has also increased. At the end of June 2018, 1,682 producers were benchmarked in the three core modules of Smartcane BMP, with 2,116 graziers engaged in Grazing BMP and 283 businesses benchmarked in the Grains BMP. » Accredited business numbers are increasing, with 261 cane producers accredited in the three water quality Smartcane BMP modules, and 102 grazing businesses accredited. Approximately 78% (some 8,730 ha) of Wet Tropics banana production area is included in the BMP program.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Proposed changes to the Reef regulations of the <i>Environmental Protection Act 1994</i> .	\$2,261,869	\$1,219,163	Additional	DES	Develop and consult on proposals to broaden and enhance the Reef protection regulations. The regulatory proposals are to target key land-based activities in all Great Barrier Reef catchments to reduce nutrient and sediment pollution to help meet the Reef 2050 WQIP water quality targets.	A Consultation Regulatory Impact Statement (RIS) was prepared and released for public consultation between 7 September and 3 November 2017 and again between 22 January and 19 February 2018 due to the Queensland election. Over 50 submissions on the RIS were received. Following an analysis of the submissions, targeted consultation occurred with agricultural, urban and industrial stakeholders, conservation groups and regional Natural Resource Management (NRM) bodies on refining the regulatory proposals.
	Build compliance capacity for erosion and sediment control during urban, industrial and infrastructure construction and maintenance.	Part of the planned investment above.	\$375,360	Additional	DES	<i>Erosion and Sediment control capacity building and urban stormwater quality management</i> The project seeks to deliver a range of activities to build the capacity of local councils and other stormwater managers to improve urban water quality objectives through erosion and sediment control practice improvement and frameworks.	<ul style="list-style-type: none"> » DES and Healthy Land and Water (HLW) provided support to the Reef Urban Stormwater Management Group (RUSMG). HLW implemented a suite of capacity building activities with local councils and industry, including three local embedding periods for compliance and policy training, four workshops on compliance guidelines for building sites; two 'community of practice' workshops in the Wet Tropics on behaviour change for building and land development; two compliance and erosion and sediment control training field days in Rockhampton and Cairns; 'high efficiency sediment' (HES) demonstration site at water treatment plant in Townsville for emerging technologies and training sessions and an HES training session in Cairns. » Preliminary findings on refined objectives of water sensitive urban design were completed, delivering a comprehensive factsheet on innovative passive irrigation technologies (street trees and wicking beds).
			\$35,000	Additional	DES	Data and project management system development for Reef projects began in 2017-2018.	Proof of concept has been trialled with key Reef program projects.
	Targeted compliance program under the <i>Environmental Protection Act 1994</i> .	\$1,650,000	\$1,325,420	Annual	DES	The Reef compliance program administers the regulatory provisions of Chapter 4A of the <i>Environmental Protection Act 1994</i> (the Act), covering the three priority areas of the Wet Tropics, Burdekin Dry Tropics and the Mackay Whitsunday catchments.	<ul style="list-style-type: none"> » A total of 334 compliance activities were completed during 2017-2018. » Impacts of Cyclone Debbie in parts of the Mackay Whitsunday catchment and severe wet season flooding in early 2018 in some Wet Tropics catchments have impacted access to some farms. » The program continues to contribute to water quality monitoring in the Wet Tropics.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Enhance integration of data and use the Water Tracking and Electronic Reporting System (WaTERS) to capture point source release monitoring and tracking data online.	\$75,000	\$55,000	Additional	DES	<p>Deliver a digital and spatial database that captures point source releases within Great Barrier Reef catchments.</p> <p>Unspent funds from Stage 1 will be carried forward to 2018-2019 to support Stage 2 of the project. Stage 2 will refine the metadata, recommend standardised monitoring and regulation and propose a framework for developing best practice environment management.</p>	<p>The project delivered:</p> <ul style="list-style-type: none"> » A broad risk assessment of the activities and potential nutrient loads associated with point source release licensed under the <i>Environmental Protection Act 1994</i>, within Reef catchments. » A digital database and spatial layer of point source nutrient releases.
Culture of innovation and stewardship							
Extension and education							
Support land managers to increase capacity to adopt improved management practices, e.g. through coordinated extension, education and awareness programs.	<p>Boost extension resources, providing greater access for farmers to extension services to enable greater practice change in Great Barrier Reef farming communities and building long-term capacity in the advisory services.</p> <p>Enhanced education and extension coordination to support large scale land management practice change through:</p> <ul style="list-style-type: none"> » Stakeholder engagement to achieve practice change » A review of current extension and education approaches » Development of a three year program plan and implementation strategy » Developing a framework for education and extension. 	\$1,135,000	\$2,116,018 Outcomes and expenditure are combined as projects are interrelated.	Additional	DES *DAF	<p>These projects support enhanced education and extension co-ordination by establishing and expanding regional partnerships, strengthening the links between extension and other programs, facilitating knowledge transfer between key stakeholders, minimising duplication of effort across extension activities and responding to the relevant areas of need identified in the independent review of Reef extension.</p> <p>This project is developing regional extension networks so that they have clear and transparent structures, systems and processes to coordinate extension programs.</p>	<ul style="list-style-type: none"> » Regional extension co-ordinators are working together to support cross-regional and cross-industry links and co-ordination in extension programs. » Co-ordinators are facilitating regional extension groups in each Reef region, made up of public and private extension service providers, to share information and identify extension needs and gaps. » Regional extension groups coordinators have developed regional extension plans to strategically coordinate extension projects and prioritise future investment to build on and value add to current extension programs, address skills gaps and training needs, and develop innovative ways to accelerate adoption of improved management practice and water quality outcomes. » A Geographic Information System (GIS) platform has been developed to monitor and evaluate extension effort at a regional scale. » A Reef Extension Coordination Benchmark Report 2018 was completed to serve as a baseline for future assessments of extension performance and collaboration.
		\$1,000,000					

* DAF amounts will include previous year's underspend

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Pilot an agriculture capacity building program focusing on extension training networks and interns.	This project has a specific spend of \$50,000 but is part of the above activity.	\$50,000	Additional	DES	A pilot agriculture capacity building program supported the capacity building of six new graduate extension officers by providing training and mentoring, as well as the establishment of support networks that enables them to connect well with landholders and build solid relationships based on trust. The training was provided in two streams: Stream 1 focused on generic extension skills and Stream 2 focused on industry technical training needs.	<ul style="list-style-type: none"> » Stream 1 workshops (Extension skills) were delivered, including a series of monitoring and evaluation workshops. » Stream 2 technical workshops were delivered including soil conservation, herbicide management, water monitoring, and precision agriculture workshops. » Trainees have created and commenced implementation of their work plans. They shared their experiences from the graduate program during a bus tour where each graduate hosted a session in their host organisation. » Five trainees have continued employment in their host organisations. » Mid-term progress report was delivered for the program.
	Including extension and education activities targeted at adoption of voluntary industry-led BMP programs.	\$3,830,000	\$2,797,000	Annual	DAF	<p>DAF scientists and agronomic specialists develop innovative solutions, provide on-ground support to producers and mentor those delivering extension to the industry-led cane, grazing, grains and horticulture BMP programs.</p> <p>While the cane and grazing programs are continuing, the grains and horticulture support programs are new.</p>	<ul style="list-style-type: none"> » The cane extension team has engaged 1,127 growers farming approximately 164,000ha. Activities include: nutrient management planning, chemical application training, promoting soil health and controlled traffic systems, use of drone technology, and agronomy for alternative crops for crop rotation. » The ‘StoolZippa’ was developed with the cane industry to better close the slot behind sub-surface application of fertiliser and pesticide. Initial trials have shown reductions in fertiliser and pesticide run-off losses of up to 50% and 65% respectively. » A draft ‘BMP Training for Agribusiness’ manual and initial training is helping agri-business improve their knowledge and understanding of pesticide risks to the environment. This will lead to better recommendations to growers on the right pesticide to use for efficacy and better water quality outcomes. » The Pesticides Working Group has renewed plans to improve pesticide use in Great Barrier Reef (GBR) catchments. » DAF’s grazing extension team have worked with, and geographically recorded the impact of, 191 unique properties representing over 3.6 million ha of extensive rangelands across the Burdekin, Fitzroy, and Mackay Whitsunday regions. Within the Burdekin catchment DAF has worked with graziers from 153 properties impacting on 22% of the area (3.1 million ha), representing 20% of the beef herd. The project team have worked with approximately 25% of the Burdekin beef industry in 2017-2018.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Increased use and improved function of nominated grazing extension tools for extension service providers to support the capacity of graziers to make climate responsive management decisions using decision support tools such as FORAGE and Vegmachine.	\$500,000	\$320,000	Annual	DES	<p>This joint project with DAF leverages funding through the Drought and Climate Adaptation Program which provides a unique opportunity to rebuild core capacity of grazing scientists to provide the tools graziers need to maintain land condition in Queensland's drought-prone climate, which will ultimately reduce sediment loads to the Reef.</p> <p>Unspent funds will be carried forward to 2018-2019 to deliver contracts.</p>	<ul style="list-style-type: none"> » Modelling underpinning the FORAGE decision support tool was significantly improved. » Improved the pasture model (GRASP) using new innovative techniques including green cover analysis. » Engaged with grazing industry to develop FORAGE pasture growth report for DAF extension officers and rural consultants. Report to be released in 2018-2019. » Worked with DAF beef extension officers and consultants to promote FORAGE to the grazing industry including presentations at workshops and field days. » Attended Beef Week 2018 to promote FORAGE and LongPaddock.
	Project Cane Changer—a large-scale social change program in the Wet Tropics to better understand motivations and associated benefits of behaviour change to encourage cane farmers to adopt actions that will improve water quality outcomes.	\$1,217,932	\$1,185,410	Additional	DES	<p>Project Cane Changer is an initiative designed to better understand sugarcane growers and help increase adoption of best management farming practices.</p> <p>The project draws on evidence-based principles of psychology and human behaviour to design, implement, and evaluate an industry-wide program that aims to understand the day-to-day challenges facing cane farmers and to recognise, value and accelerate their efforts to adopt farming practices that help protect the Reef.</p> <p>Focused in the Wet Tropics region, the project is driven by the CANEGROWERS organisation, in partnership with human behaviour experts, Behaviour Innovation.</p>	<ul style="list-style-type: none"> » The development, testing and implementation of several key strategies to effect behaviour change and environmental and social benefits were undertaken. These behaviour change strategies covered the following areas: women and families; monitoring change; innovation; and leadership and ownership. » Additionally, the communication and destigmatisation strategy was developed and implemented; as a result of this strategy over 100 Cane Changer communication materials were published online, 50+ articles were published in print, and several television and radio segments were produced. » Over 200 cane farmers have signed the Cane Changer commitment. » More information is available at: www.canechanger.com/

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Wetlands demonstration on-ground case studies, wetlands extension with clients, management of local wetlands committees, development and delivery of wetlands information and tools for landholders.	\$100,000	\$160,000	Annual	DAF	The WATER project has provided information and support to agricultural industries on the long-term sustainable use and management of wetlands within and downstream of agricultural production systems.	<ul style="list-style-type: none"> » An online toolkit of information on treatment systems for improving water quality in agriculture production systems was developed for the WetlandInfo website. » Interim guidelines for bioreactors developed for the design, operation and monitoring of bioreactor trials in the Great Barrier Reef catchment. » A case study was developed showcasing sustainable grazing land management on Calliungal floodplain (Fitzroy Basin) for the WetlandInfo website to demonstrate how grazing has been sustainably managed, leading to a productive grazing enterprise whilst retaining healthy wetlands with high biodiversity value. » Stakeholder networks were facilitated in the Mackay Whitsunday, Burdekin and Wet Tropics regions to improve communication and collaboration between personnel involved in wetland management projects.
	Targeted extension approach to accelerate adoption of improved grazing management practices in priority areas in the Burnett Mary region.	\$364,825	\$207,357	Additional	DES	<p>The Burnett Mary Regional Group were engaged to deliver a targeted extension program to accelerate the adoption of improved grazing management practices with previously unengaged graziers.</p> <p>Targeted priority areas include the Lower Baffle, Lower Kolan, Lower Burnett and the Gregory and Isis sub-catchments of the Burrum basins.</p>	<ul style="list-style-type: none"> » To date, the project has been highly effective in engaging with ‘unengaged’ graziers in priority areas. 14 grazing businesses have been engaged out of the target 50 graziers required by June 2020. » Three demonstration sites have been identified as part of this water quality project. One property has a completed property assessment to create a rehabilitation plan as well as ongoing support from technical and extension staff to ensure implementation of necessary changes. » Other management strategies identified include re-establishing the natural balance between trees, legumes and 3P (palatable, perennial and productive) pasture species, strategic cultivation, improving soil health and ground cover to improve the overall land condition.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	<p>Implementation of two Major Integrated Projects (MIPs) in the Wet Tropics and Burdekin regions to pilot a range of activities with producers and the community to reduce nutrient, pesticide and sediment loads into local waterways and ultimately the Great Barrier Reef.</p> <p>*Note – this program funding included a monitoring, modelling, evaluating and reporting component that, for delivery purposes, has been included in the line item Evaluating performance, Implementation of Paddock to Reef program. Monitoring Modelling Evaluating and Reporting.</p>	\$10,748,914	\$6,492,431	Additional	DES	<p>The objective of the MIPs is to work closely with groups of landholders in focus areas within the Wet Tropics and Burdekin regions, to trial a range of regionally tailored, coordinated actions that reduce nutrient, sediment and pesticide loads entering the Great Barrier Reef waters.</p> <p>Throughout the MIPs, the progress in achieving land management practice changes, economic benefits for landholders and pollutant load reductions will be closely monitored and results will inform adaptive management. It is hoped that by concentrating effort into one or two areas and closely involving landholders in the design and implementation of the projects, a steeper trajectory in water quality improvement will be achieved than would otherwise occur.</p> <p>The Major Integrated Projects (MIPs) teams experienced significant challenges in appointing personnel, with a number of recruitment rounds required to fill some positions. These recruitment challenges have caused delays in planning and delivering on-ground activities in the first year of implementation. The underspend reflects that some of the milestones planned to be delivered in the first year of implementation were delayed or only partially delivered due to lack of staff to progress activities. As of September/October 2018, both MIPs have recruited full teams. Feedback from natural resource management groups is that recruitment delays may be due to an emerging skills shortage in required fields of expertise and difficulty in attracting candidates to regional areas with short-term contracts and unclear career pathways.</p>	<p>Implementation of the two MIPs commenced September 2017, focused on delivering the outcomes and actions identified in stage one (program design).</p> <p>Establishing project foundations and commencing key initiatives to convert the strategic goals of the program design into execution has seen year one delivery focus on:</p> <ul style="list-style-type: none"> » Development of governance arrangements and frameworks to support program implementation. » Recruitment and appointment of project staff. » Landholder engagement and awareness campaign to recruit participants in MIPs activities. » Commencement of on-ground extension and training programs to support management practice improvement. » Identification and establishment of sites for remediation, including round one gully and systems repair sites (bioreactors/ wetlands). » Establishment and collection of baseline monitoring data. » Project oversight, guided by the steering committee and project panels to support alignment of MIP activities in achieving project outcomes. » More information can be found at: <ul style="list-style-type: none"> » www.qld.gov.au/environment/agriculture/sustainable-farming/reef-major-projects

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	DES's scientific information, technical expertise and advice supports research agendas underpinning the Reef 2050 WQIP and the Queensland Government.	\$140,000	\$120,000	Annual	DES	<p>This investment supports DES Science's technical expertise, analysis, advice and science and research programs underpinning the Reef 2050 WQIP and the Queensland Reef Water Quality Program.</p> <p>Program support includes facilitation and participation in governance arrangements, committees and technical working groups.</p> <p>Unspent funds will be carried forward to 2018-2019 to improve communication of Reef and science outcomes.</p>	<ul style="list-style-type: none"> » Provided scientific and technical advice and information to inform the development of key Reef policies and programs. » Participated in Reef governance and collaborated across Reef stakeholders to support integrated delivery of policy, science, monitoring, modelling and evaluation, particularly to ensure consistency in field data collection standards and monitoring programs across organisations. » Peer reviewed science program technical reports were made available through the Queensland Government publications portal. » Value-added to technical advice from other research organisations to ensure alignment with government outcomes.
Economic validation of practices							
Identify and address barriers to change and practice improvement uptake through programs and policy.	Validating the economics of management practices that improve water quality and providing this information to landholders in decision support tools and as part of the extension program.	\$1,250,000	\$535,000	Annual	DAF	<p>DAF's Economics project is a new and major initiative under the Queensland Reef Water Quality Program.</p> <p>The program delivered significant outputs and outcomes for the 2017-2018 year, notably the validations of practices in both the cane and banana industries.</p>	<ul style="list-style-type: none"> » The Banana Best Management Practice (BMP) Economics Project (RP140B) was completed. The project demonstrated that adopting Banana BMP practices can both improve profitability and water quality outcomes. The extension of these outputs, through grower workshops and media presence, has made a significant contribution to the economic information available for industry, government and community. Publications are available online at: www.qld.gov.au/environment/agriculture/sustainable-farming/reef-projects-current » Completion of the sugarcane BMP project in the Wet Tropics. The economic and environmental impacts of adopting Smartcane BMP were examined for six sugarcane farms in the Wet Tropics (located near Ingham, Tully, Innisfail, Cairns and Mossman, and ranging in size from 90 to 830ha). The project findings were extended to over 300 growers in the Wet Tropics during industry workshops. » Initiated the development and upgrade of Economic Decision Support Tools (on-line versions of FEAT and Breedcow Dynama). » Initiated the ground cover project in grazing, including presentation of preliminary case study results at Beef 2018. The case study shows that keeping high ground cover allows resilience and better decision-making, particularly through drought.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
Innovation							
Trial and implement innovation in technologies for on-ground management, water treatment and monitoring.	Great Barrier Reef Innovation Fund addressing agricultural management practices, water treatment systems and water quality monitoring and support to the Coral Abundance Innovation Challenge.	\$1,443,934	\$1,056,816	Additional	DES	<p>Expressions of interest were called for:</p> <p><i>Treatment systems trials for nutrient and pesticide reduction in Great Barrier Reef catchments</i>, to obtain fully scoped and costed proposals for conducting and evaluating trials of water treatment systems that can effectively reduce nutrient and pesticides that flow into the Great Barrier Reef lagoon. Funding also supports expert project management of treatment system trials.</p> <p><i>Innovative agricultural practices and restoration projects</i> to develop and trial unproven management practices designed to lead to improved Great Barrier Reef water quality, was called in early 2017, with proponents contracted in mid/late 2017.</p> <p><i>Advance Queensland Small Business Innovation Research (SBIR) challenge.</i></p> <ul style="list-style-type: none"> » Affordable water quality sensors <p>Reef Trust Enhanced Efficiency Fertiliser (EEF) project is a joint investment between the Australian (Reef Trust) and Queensland Governments (OGBR) into the trial of enhanced efficiency fertiliser use in the sugarcane industry.</p>	<p>Successful projects:</p> <p><i>Treatment systems trials for nutrient and pesticide reduction in Great Barrier Reef Catchments.</i></p> <ul style="list-style-type: none"> » Determining the role of a constructed surface-flow treatment wetland system in improving water quality in the Barratta Creek Catchment. » Bioreactors for GBR (B4GBR): developing and networking of nitrogen mitigation in cane and bananas (delivered by DAF). » Denitrification bioreactor trial in the Russell Catchment of the Wet Tropics. » Validation of water quality improvement - wetland treatment trains in Mackay region. <p><i>Innovative agricultural practices and restoration projects.</i></p> <ul style="list-style-type: none"> » SyncFert (Synchronised controlled release fertiliser). » Trialling remote livestock management systems (RLMS) with satellite pasture data for grazing land management in the Fitzroy. » Reducing run-off using deep rooted crops - radishes for water quality. » Maximising the efficacy of variable rate technology to reduce nutrient use and sediment transport in vegetable and melon production (delivered by DAF). » Bentonite and limestone use in sugarcane for improved soil and water quality. <p>Projects under the Small Business Innovation Research (SBIR) Project completed their feasibility trials of cheaper water quality monitoring sensors, and built upon the Proof of Concept, trialling sensors at various locations across Great Barrier Reef catchments.</p> <p>CANEGROWERS and Sugar Research Australia are delivering trials of EEF across the Great Barrier Reef cane regions, with close to 60 growers participating in the trials. The trials target reductions in nitrogen losses in run-off by increasing nitrogen use efficiency (NUE).</p> <p>More information about innovative projects in Great Barrier Reef catchments can be found at www.qld.gov.au/environment/coasts-waterways/reef-program/innovation-fund</p>

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	<p>Implement projects to build on successful trials of on-ground management practices.</p> <p>DAF's agricultural research and development projects in relation to grazing, sugarcane, grains, bananas and horticulture with partner organisations, including industry and universities that provide significant Reef water quality benefits through exploring new technology and practices, improved pesticide and fertiliser management, economic evaluation and incorporating improved management into farming systems.</p>	\$1,110,000	\$1,110,000	Annual and co-contribution	DAF	DAF's agricultural research and development projects are trialling innovative practices in cane, grazing, grains and horticulture.	<ul style="list-style-type: none"> » Biophysical data has been collected and is being analysed for 20 trials of innovative practices in the cane industry. Analyses will validate the impact of these water quality improving practices on business performance. » DAF has established high-intensity grazing trial sites, gathered baseline data and delivered training for the innovative use of intensive grazing for gully remediation. » A Next Generation fertiliser project has identified several promising fertiliser formulations, including those that can decrease leaching losses, increase overall N uptake, and increase late-season nutrient uptake.
Science in the Paddock							
	<p>Targeted projects of direct action to address water quality pollutants across all agricultural industries based on priorities through Science in the Paddock program.</p>	\$4,276,410	\$2,902,116	Annual and additional	DES	<p>The <i>Cane to Creek project</i> is working with 30 sugarcane growers in the Russell-Mulgrave Catchment over two years to increase adoption of best and innovative nutrient management, supporting the development and application of nutrient management plans, with the goal of improving water quality. This will contribute to Reef 2050 WQIP Plan goals of achieving at least 50% reduction of end of catchment dissolved inorganic nitrogen (DIN) loads.</p> <p><i>Science in the Paddock</i> investment in research and development in 2017–2018 continued in the areas of nutrient use efficiency, weed management in cane systems, sediment management, optimum soil phosphorous in banana systems, economic analysis of banana BMP practices, demonstration and promotion of on-ground practice change.</p>	<p><i>Cane to Creek project</i></p> <ul style="list-style-type: none"> » Nutrient management plans have been completed for the group of 10 core growers, and they are being supported to implement the plans. » Nutrient management demonstration sites identified and implemented. » Growers, staff and local extension staff trained in water sampling, analysis and management. » Communication resources, including information sheets, produced on key practices. » Behaviour Innovation training completed by extension staff. <p><i>Science in the Paddock</i></p> <p>27 projects were underway in 2017-2018, across areas including:</p> <ul style="list-style-type: none"> » Improved knowledge of nutrient and sediment processes in agricultural systems. » Pesticide monitoring and progress towards guidelines. » On-ground demonstration of improved practice.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
						<p>DAF's Northern grazing demonstration project aims to demonstrate how adaptive management strategies can improve grazing land condition, animal production and profitability in priority areas of the Burdekin Catchment. These include demonstration sites on properties in priority sub-catchments of the Upper Burdekin, Fitzroy, Upper Herbert and possibly, the Bowen-Broken.</p> <p>These demonstrations are based on the learnings from the long-term Wambiana Grazing Trial. This project also contributes to furthering the work on regenerating 'C' condition land using wet season spelling on the Wambiana Grazing Trial.</p> <p><i>Sandy Creek – on farm change for water quality improvement</i></p> <p>Sandy Creek, in the Plane Catchment of the Mackay Whitsunday region, is considered a very high risk area for pesticides and a high risk area for nitrogen. Improvement in water quality depends upon improving land management practice by growers.</p> <p>To improve water quality flowing from Sandy Creek to the Great Barrier Reef, this project is:</p> <ol style="list-style-type: none"> Monitoring sub-catchment water quality to link farm practice to in-stream water quality and direct extension activities to sub-catchments where water quality exceeds guidelines. Providing targeted extension services to reduce off-farm losses of pesticides and nutrients through adoption of specific management practices. Identifying management practice change barriers and developing strategies to overcome these through novel social approaches. 	<p><i>DAF's Northern grazing demonstration project</i></p> <ul style="list-style-type: none"> » This project is engaging with graziers and three demonstration sites have been established on grazing properties in the Upper Burdekin, Upper Herbert and Fitzroy. Bowen/Broken/Bogie. A fourth site will be established in the Bowen/Broken/Bogie by the end of 2018. » Producer groups have been set up for each site and meetings have been held. The group in the Upper Herbert has also conducted a field day showcasing projects for that area. The Wet Season Spelling work on Wambiana property is on track. <p><i>Sandy Creek – on farm change for water quality improvement</i></p> <ul style="list-style-type: none"> » Industry-led monitoring supported by DES scientists, continued to engage growers and industry, creating ownership of the results and improving the understanding of processes resulting in loss of chemicals from farming production systems. » Mackay Area Productivity Services (MAPS) officers visited managers of up to 140 farms to provide assistance and advice to increase adoption of beneficial practices with a focus on pesticide and fertiliser use. Follow-up intensive extension provided with 20 growers. » Farmacist conducted farm demonstration trials to show how improved practices reduce water quality impacts without affecting productivity. » Griffith University commenced social research to identify practice change barriers and better target project communications.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Demonstration projects to encourage improved practice uptake at a local scale.	\$850,151	\$282,225	Annual	DES	<p>The project <i>Engaging Burdekin sugar farmers for improved water quality outcomes</i> will trial effective methods to increase sugarcane farmer (farmer) adoption of farm management practices to achieve Reef water quality outcomes and improve the ecological function of coastal wetlands. This demonstration project will show that farming profit, productivity and environmental benefits can result from practice change. The engagement strategy and model achieved in this project is anticipated to be able to be applied across the region.</p> <p><i>Protecting our chemicals for the future</i> through accelerated adoption of best management practice project with sugarcane growers to raise awareness of practices that have the potential to reduce the negative water quality impacts of herbicides and insecticides used in the process of cane production and to bring about practice change.</p>	<p>The project <i>Engaging Burdekin sugar farmers for improved water quality outcomes</i> has successfully engaged 14 cane farms adjoining Horseshoe and Lilliesmere Lagoons. Water monitoring results have been provided to each farmer in a personalised report. A number of farmers have shown a willingness to change practices, many trialling different nitrogen products with some application rate reductions.</p> <p><i>Protecting our chemicals for the future</i> 13 field demonstrations and Paddock to Reef R benchmarking of new growers has been completed. Growers have also been involved in the planning and design of demonstration activities/information sessions.</p>
	Burdekin cane farmer engagement: complete nutrient management planning for cane farming.	\$798,100	\$470,900	Annual	DES	<p>The aim of the project is to engage 210 cane farms in the Burdekin area and help adjust fertiliser rates in line with SIX EASY STEPS, as required for their crop. This will contribute to Reef 2050 WQIP objectives of achieving 60% reduction of nitrogen in anthropogenic end-of-catchment dissolved inorganic nitrogen loads.</p>	<ul style="list-style-type: none"> » The project has engaged a further 60 farms in 2017–2018 delivering the full program including personalised nutrient management plans, calibrations, baseline and post practice surveys while providing on farm and over the telephone support to the growers for a full year. » Google Earth and SIX EASY STEPS training was offered to all growers. » A grower catch-up day was held with good attendance. » Eight confidence plot trials were concluded with favourable results for grower productivity despite the reductions in the nitrogen rates. » This year, the project achieved a 53 tonne reduction in nitrogen application across engaged farms and a 1.8 tonne reduction in phosphorus application.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
Catchment restoration							
Use and where required enhanced guidelines, Traditional knowledge, and other decision support tools to design and inform interventions.	Queensland Wetlands Program. Provision of wetlands tools and WetlandInfo web site. Delivery of 'Walking the Landscape' whole-of-catchment management understanding.	\$200,000	\$200,000	Annual	DES	The Queensland Wetlands Program continues to provide policy, governance, tools, information and stakeholder relationships in order to ensure the effective delivery of the Wetlands in the Great Barrier Reef Management Strategy 2016–2021.	<ul style="list-style-type: none"> » Maintained and updated the WetlandInfo website. » Maintained and provided secretariat support for the Great Barrier Reef Wetland Network. » Delivered 'Walking the Landscape' and management intervention workshops and built capacity in regional NRM bodies to facilitate their own workshops. Workshops held 2017-2018: <ul style="list-style-type: none"> › Tully and Johnstone (lower) › Upper Johnstone › Upper Barron › Susan River › Bohle and Ross › Black and adjacent catchments › Magnetic Island » Total of 22 catchment stories have been released on WetlandInfo. » Release of a Wetlands Research Case Study: Cost-effective restoration of wetlands that protect the water quality of the Great Barrier Reef. www.wetlandinfo.ehp.qld.gov.au/resources/static/pdf/resources/fact-sheets/rcs-great-barrier-reef-fernanda.pdf » Continued to encourage uptake of the Wetland Projects Search Tool (an interactive online spatial tool that features over 550 individual, on-ground wetland-related projects across all of Queensland, with a focus on the catchments of the Great Barrier Reef—hosted on WetlandInfo). » Provided input into the 2017 Great Barrier Reef Scientific Consensus Statement.
Trial and implement innovation in catchment repair and restoration projects to reduce sediment and nutrient delivery to the Reef.	Targeted projects of direct action through sustainable landscape management and system repair including riparian revegetation, gully repair, streambank stabilisation and coastal wetlands rehabilitation.	\$1,659,000	\$0	Annual	DNRME	This program of work will begin in the 2018-2019 year.	

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Streambank and gully remediation projects including innovative gully remediation in partnership with Greening Australia and erosion management plan and operational works on Springvale Station.	\$1,533,910	\$1,474,589	Additional	DES	<p><i>Springvale Station</i></p> <ul style="list-style-type: none"> » The Springvale Station Erosion Management Plan (EMP) was delivered and will be used to guide erosion management activities on Springvale Station. Implementation of the erosion management plan will commence in 2018-2019 year. » A range of on-ground operational works have been undertaken guided by the EMP. » Over time and through appropriate land management and remediation works, the aim is to reduce the risk of new gully erosion occurring, to reduce the areas subject to gully erosion and growth of established gullies. <p><i>Greening Australia</i></p> <p>The project is a collaboration between the Queensland Government and Greening Australia under the Great Barrier Reef Innovation Fund. The primary purpose of the project is to trial different techniques for gully remediation (in the Burdekin) to deliver more cost-effective solutions that can be applied across Great Barrier Reef regions.</p>	<p><i>Springvale Station</i></p> <ul style="list-style-type: none"> » The Springvale Station Erosion Management Plan was completed in August 2017 and is available at: www.qld.gov.au/environment/assets/documents/coasts-waterways/catchment-management/springvale-station/springvale-emp.pdf » A Technical Support document is available at: www.landmanager.capeyorknrm.com.au/tools-resources/springvale-station-EMP-technical-report » Sections of Keetings Track have had significant works undertaken to form and drainage. This will enable better access to major road gully choke points when gully remediation actions commence. » Actions are almost complete to decommission Cook Dam (approximately 28ha), an unauthorised dam on the property with approximately 1000ML capacity. Works have lowered the wall to retain a smaller water storage area and a fish ladder to allow fish movement between river and the storage. » A program of surveying feral pig and cattle distribution (benchmarking) has been undertaken and a feral pig management program has been implemented. » As part of the broader Springvale Station Communication Framework, information on Springvale including the sediment management approaches have been uploaded to the Wetland Info's Normanby Catchment Story, at: www.wetlandinfo.ehp.qld.gov.au/wetlands/resources/video.html » The project contributed to improve monitoring for the Normanby River water quality monitoring program and the Great Barrier Reef Catchment Loads Monitoring Program. <p><i>Greening Australia</i></p> <ul style="list-style-type: none"> » A minimum of 12ha of direct interventions have been achieved this works year. » A monitoring station was installed by DES, downstream of the trial sites. » The results from the Phase 1 monitoring program have been collated and are currently being interpreted by an independent expert. » The monitoring program has been reviewed and lessons learned will be documented in the Monitoring Strategy.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
						<p><i>Bioavailable nutrients</i></p> <p>To progress our scientific knowledge of the Bioavailability of Nutrients in Great Barrier Reef (systems and improve the management response two tasks were progressed:</p> <ul style="list-style-type: none"> » Report on the range and dominant particle size of sediments across Great Barrier Reef catchments to inform the Source catchment models and eReefs. » Provide advice on improvements to algorithms and pedotransfer functions. » Deliver a workshop to clarify the current state of knowledge and future needs on the bioavailability of particulate nutrients from land-based sediment run-off to the marine ecosystem. 	<ul style="list-style-type: none"> » Collaboration with NQ Dry Tropics, National Environmental Science Program (NESP) and Reef Trust is maximising investments and evaluation of the effectiveness for Strathalbyn. » As part of the Project Communication Plan, a Forum Report detailing innovative gully remediation options was completed and two public project communiques have been distributed, and can be found at: www.greeningaustralia.org.au/wp-content/uploads/2018/04/IGRP_Forum-Outcomes-Report_FINAL_20180327.pdf <p><i>Bioavailable nutrients</i></p> <ul style="list-style-type: none"> » A draft report on the range and dominant particle size of sediment across Great Barrier Reef catchments has been completed by DES scientists. » Trial runs of the Source Catchment model have been run and the impact of changes to the way bioavailable nutrients are treated is incorporated into the draft report. » A workshop co-funded by NESP and the QRWQP, including representatives in research, policy, Paddock to Reef modelling extension and Queensland and Australian governments was held and a concept paper from the results of the workshop has been drafted.
	Reef Islands Project—protecting the Reef’s most precious land and seascapes with a focus on islands and their adjacent waters.	\$3,000,000 across five projects.	\$3,000,000	Additional	DES	<p>The Reef Islands Initiative aims to deliver a tailored program of on-ground and in-water actions across a network of Great Barrier Reef islands of high conservation value, boosting their resilience, and providing critical habitat for important land and marine species in the face of climate change. The project will establish a network of climate change refuges across five reef islands, helping to protect the reef’s most precious land and sea-scapes as critical animal habitats in the face of climate change.</p> <p>The project is being undertaken by the Great Barrier Reef Foundation, and will see a total investment of \$14 million over 10 years, with the Queensland Government investing \$3 million, along with \$5 million from Lendlease, \$5 million from the Australian Government, and \$1 million from private philanthropist Stephen Fitzgerald.</p>	<p>The Reef Islands Project was launched in April 2018. Five island groups are being selected and prioritised by Queensland Parks and Wildlife Service and the Great Barrier Reef Marine Park Authority as part of the Joint Field Management Program according to their biodiversity, conservation value and threat level to these values.</p>

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Reef water quality projects in the Central Queensland region seeking to reduce nutrient, pesticide and sediment losses to waterways.	\$2,000,000 across five projects. \$645,000 planned investment for 2017-2018.	\$482,485	Additional	DES	<p><i>Delivering tailored solutions to Mackay Whitsunday growers to improve nutrient management</i> The project will engage with 150 farms (50 in 2017-2018) in the Mackay Whitsunday region with the aim of improving their confidence and skill sets required to implement the SIX EASY STEPS program on their farm through tailored agronomic support. Working with the respective productivity services, the project will engage with 50 farms in each year from across the Mackay, Plane Creek and Proserpine regions. Growers will be benchmarked on current practices, then working with a skilled, local agronomist, a tailored nutrient plan based on the SIX EASY STEPS will be provided.</p> <p><i>Pathways to water quality improvements in the Myrtle Creek sub-catchment</i> This two year project will work with up to 40 sugarcane growers in the central region to identify and implement practice change opportunities to reduce nitrogen and pesticide losses from sugarcane farms. Each group of 10 growers will monitor and evaluate end-of-paddock water quality impacts of their changed practices.</p> <p><i>Fitzroy River Catchment Erosion Gully Restoration: reducing the Great Barrier Reef Sediment Load</i> This project will undertake erosion gully restoration in conjunction with local landholders in high priority areas within the Fitzroy River Catchment (e.g. located within the Mackenzie Management Unit—near Blackwater or Lower Dawson) of central Queensland. Greening Australia’s integrated approach focuses on building on our work already underway in this catchment, as well as surrounding catchments.</p>	<p><i>Delivering tailored solutions to Mackay Whitsunday growers to improve nutrient management</i> 50 farms have been engaged in the project. All farms have been taken through the benchmarking process and nutrient management plans are being provided.</p> <p><i>Pathways to water quality improvements in the Myrtle Creek sub-catchment</i> Commencing in May 2018, this project has begun engaging with growers with sites identified and equipment ordered.</p> <p><i>Fitzroy River Catchment Erosion Gully Restoration: reducing the GBR Sediment Load</i> This project will begin in the 2018–2019 year.</p>

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
						<p><i>Grassroots Project</i> Resource Consulting Services (RCS) are working with 25 grazing businesses in the Fitzroy and Mackay Whitsundays Reef catchments to increase the adoption of management practices that reduce soil and particulate nutrient losses to the Great Barrier Reef. RCS has provided skills training and tailoring advice to suit individual circumstances. They will work with graziers to help improve profitability, facilitate the transition towards 'A' class land condition, showcase sustainable grazing businesses to the wider grazing community and hence help to reduce sediment entering Reef waters.</p> <p><i>Janes Creek - achieving whole of system water quality improvement in the Mackay region.</i> This project will endeavour to achieve a whole-of-system project integrating management practice adoption, system repair and treatment solutions to improve water quality within the Janes Creek catchment.</p>	<p><i>Grassroots Project</i></p> <ul style="list-style-type: none"> » Some 25 grazing businesses have completed the RCS 'Grazing for Profit' course and are enrolled in the in RCS Next Steps. » These graziers have also completed a BMP assessment and Paddock to Reef Water Quality practice change questionnaire, including social monitoring questions. » Graziers will undergo a BMP re-assessment and Paddock to Reef Water Quality practice change questionnaire to help determine management practice change. <p><i>Janes Creek—achieving whole of system water quality improvement in the Mackay region.</i> This project has engaged 8 of the 9 cane farmers in the region with further engagement planned throughout the year. A new site for a water quality monitoring station has been identified with construction due to begin in late 2018.</p>

Enabling delivery

Science and knowledge

Identify, prioritise and fill knowledge gaps through the Reef 2050 Water Quality Improvement Plan Research, Development and Innovation Strategy (RD&I).	RD&I strategy development.	No project cost.			DES	Development of the Reef 2050 Water Quality Research, Development and Innovation Strategy completed.	<ul style="list-style-type: none"> » The strategy prioritises the knowledge needs for the next five years to support the Reef 2050 Water Quality Improvement Plan. » The knowledge needs were identified through the 2017 Scientific Consensus Statement, the previous Research, Development and Innovation strategies and consultation with science, policy and on-ground management experts. » Through engagement with over 100 science, policy and on-ground management experts and stakeholders at the 2017 Synthesis Workshop and through expert working groups, the identified knowledge needs have been refined and prioritised and are outlined in the Stage 1 report.
---	----------------------------	------------------	--	--	-----	---	---

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
Integrate forms of knowledge including science, policy, management, Traditional Owner and community through regular synthesis workshops and theme-specific working groups to support consistent communications messages.	Annual synthesis workshop and projects across science, policy and management.	\$395,586	\$161,140	Additional	DES	<p>The Great Barrier Reef Water Quality Science Synthesis Workshop was held in Townsville from 21-23 November 2017. The event provided an opportunity for science, government and industry practitioners to interact, share ideas and insights, and collaborate to support improved delivery and implementation of Reef water quality management activities.</p> <p>A number of project ideas and initiatives arose as part of the workshop.</p>	<ul style="list-style-type: none"> » The 2017 workshop was the second in series of synthesis activities to support Great Barrier Reef water quality management initiatives. Approximately 120 people from more than 50 organisations participated in the three-day workshop. Attendees included representatives from science, government, on-ground delivery and extension. The Reef Alliance Awards were presented at the event. Information is available at: www.qff.org.au/media-releases/reef-alliance-awards-winners-announced/ » Planning is underway for the next workshop to be held in Yeppoon in November 2018. The focus of the 2018 two-day workshop will be implementing the Reef 2050 Water Quality Improvement Plan.
Deliver decision support tools, communication and education products tailored to specific audiences, for use in education and awareness programs.	Communication projects.	\$196,610	\$124,008	Additional	DES	<p>The Great Barrier Reef Science Communication Implementation Plan brings together all science communication work and recommends products and tools to ensure effective communication to varied audiences. The main focus is developing tools that can be used by extension officers, industry and regional bodies when liaising with landholders. Some of the material will also be of interest to the broader community. The aim is to drive awareness that leads to behaviour change.</p>	<p>Development and implementation of the Science Communication Plan is being jointly funded by the Australian and Queensland governments.</p> <p>Science communication tools are under development.</p>

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Activities to improve communication and information to support large-scale change in practice, including communication tools, workshops, communication strategies and implementation plans.	\$512,302	\$460,911	Additional		<p>The social change research program supports the tracking of the human dimensions target and implementation of the human dimensions related actions, including relevant contributions to the Reef 2050 WQIP Research, Development and Innovation (RD&I) Strategy.</p> <p>The Reef 2050 Communication Network membership continues to expand and the group meets regularly (by teleconference and in-person). The network is leveraging the International Year of the Reef in 2018 to build awareness of the work underway to protect the Great Barrier Reef.</p> <p>CANEGROWERS have developed a communication strategy to communicate with sugarcane growers, industry, government and the community at large about farmer trials of Enhanced Efficiency Fertilisers in the catchments of the Great Barrier Reef, known as the EEF60 project. The trials are being jointly funded by the Queensland and Australian governments and are being conducted by Sugar Research Australia.</p> <p>DES provided sponsorship for the World Science Festival in March 2018.</p> <p>DES has partnered with the Great Barrier Reef Foundation to deliver communication tools to engage the community in protecting the Great Barrier Reef.</p> <p>DES provided sponsorship to Beef 2018—the national beef expo and one of the world’s premier beef cattle events—held in Rockhampton in May.</p>	<ul style="list-style-type: none"> » The Science Communication Implementation Plan August 2017–2020 was approved in February 2018. STEM Matters was appointed in June 2018 to implement the plan and deliver the priority tools. » A Human Dimensions working group met in March and April to create and refine Human Dimensions key research gaps and questions for the Reef 2050 WQIP Research, Development and Innovation (RD&I) Strategy. » The Communication Network coordinated activities for the International Year of the Reef (IYOR), with efforts focused on educating people about the problems facing the Reef, celebrating the great work to protect the Reef and motivating others to take action. » CANEGROWERS are leading communication relating to the cane farmer trials of Enhanced Efficiency Fertiliser in the catchments of the Great Barrier Reef (EEF60). The project is well underway with sites established in the Wet Tropics, Burdekin, Central and Southern growing regions. » DES partnered with the Great Barrier Reef Foundation, Queensland University of Technology (QUT) and Container Exchange (CoEx) for a display at the World Science Festival Street Science precinct in March 2018. The display focused on actions to protect the Reef including reducing marine debris, and introducing the lightweight single-use plastic shopping bag ban and container deposit scheme. 2,000 reusable bags were distributed. » Love the Reef is a digital game-based application (app) developed for primary school aged children that inspires a love and respect for the Great Barrier Reef, empowering them to make positive changes. The app supports the National curriculum allowing it to be used in conjunction with in-classroom learning and activities. The app will be available for download in August 2018. » The Reef Think Tank display helps build understanding of the pressures on the Reef and how everyone can contribute to improving Reef health. It appeared at the Royal Queensland Show in August 2017, the World Science Festival in March 2018 and the Commonwealth Games in April 2018.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
							<ul style="list-style-type: none"> » OGBR participated in the Queensland Government Beef 2018 precinct where the theme was sustainable beef. The event provided a good opportunity to engage directly with graziers through a trade fair, seminar, promotional materials, FORAGE mapping tool, and a scientist on hand to talk about sediment run-off.
Collaborate and coordinate between the Queensland and Australian governments, in line with the Reef 2050 Long-Term Sustainability Plan (Reef 2050 Plan) governance structures.	Secretariat support to governance groups.	\$550,000	\$622,639	Annual	DES	The Office of the Great Barrier Reef (OGBR) coordinates across the Queensland Government, and with the Australian Government, the implementation of the Reef 2050 Plan and the Reef 2050 Water Quality Improvement Plan (Reef 2050 WQIP). It provides secretariat services to a range of advisory and decision-making bodies in partnership with the Australian Government.	<ul style="list-style-type: none"> » The Reef 2050 Advisory Committee and the Reef Water Quality Partnership Committee met to provide input to the Reef 2050 mid-term review and the Reef 2050 WQIP. » The 2017 Scientific Consensus Statement was released, approved by the Reef Independent Science Panel. » Released a draft Reef 2050 WQIP for public consultation. » Finalised the mid-term review of the Reef 2050 Plan and the development of the Reef 2050 WQIP in partnership with the Australian Government, launched by the Great Barrier Reef Ministerial Forum on 19 July 2018.
Align design and management of programs.	Annual Queensland Reef Water Quality Program Investment Report/Plan.	No project expenditure.		Annual	DES	<p><i>The Queensland Reef Water Quality Program Five Year Investment Plan 2017–2018 to 2021–2022</i> was published including the key areas of investment across the program with a supporting investment table setting out the planned activities for 2017–2018.</p> <p>The Queensland Government Annual Investment Report 2016–2017 was published.</p>	<p>The following documents have been published to the Queensland Government website at www.qld.gov.au/environment/coasts-waterways/reef-program</p> <ul style="list-style-type: none"> » Queensland Government Annual Investment Report 2016-2017. » Five Year Investment Plan and 2017-2018 Investment Plan.
Ensure accountability of investment delivery and outcomes.	Program management.	\$55,500	\$16,646	Additional	DES	<p>During 2017–2018:</p> <ul style="list-style-type: none"> » The QRWQP was audited by the Queensland Audit Office (QAO) – following up on recommendations made in the 2014-2015 report <i>Managing water quality in Great Barrier Reef catchments</i>. » Ongoing coordination of the program including investment planning, monitoring and reporting. 	<p>QAO's audit found that of the five recommendations made in the 2014-2015 report, four have been fully implemented and one partially.</p> <p>Three recommendations have been made in the 2017-2018 report <i>Follow-up of Managing water quality in Great Barrier Reef catchments</i>, available at: www.qao.qld.gov.au/reports-parliament/follow-managing-water-quality-great-barrier-reef-catchments</p>

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
Evaluating performance							
Implementation of Paddock to Reef program							
Monitor and model management practice and water quality improvements through the Paddock to Reef program.	Great Barrier Reef monitoring programs: Ground cover catchment loads, riparian vegetation, wetland condition and extent monitoring.	\$1,986,000	\$1,164,000	Annual	DES	DES Science delivers key Paddock to Reef monitoring programs including monitoring and modelling of sediment, nutrient and pesticide loads, the use of remote sensing to measure landscape indicators such as ground cover, gullies and riparian vegetation and the assessment of wetlands. Unspent funding will be carried forward into 2018-2019 and out years to support program delivery.	<p><i>Great Barrier Reef Catchment Loads Monitoring Program</i></p> <ul style="list-style-type: none"> » Monitored water quality in 30 of the 35 Great Barrier Reef Basins, with sites in 36 catchments. » 43 sites were monitored for sediments and nutrients and 34 sites for pesticides. » Provided high quality pollutant loads for sediments and nutrients and pesticide concentrations data for ms-PAF risk metric from priority catchments for validation of the Source Catchments water quality models. » Produced the 2015-2016 Tier III Loads Report for the 2016 Great Barrier Reef Report Card released in October 2017. » Participated in annual Paddock to Reef information sharing events for NRM groups. <p><i>Ground Cover Monitoring Program</i></p> <ul style="list-style-type: none"> » Monitored the levels and changes in ground cover in grazing lands as a measure of the risk to soil erosion and grazing land sustainability. » Delivered spatial datasets, results and technical reports on ground cover in grazing lands for the 2016 Great Barrier Reef Report Card released in October 2017. » Continued to support and develop open data and decision support tools to support grazing BMP, drought management programs and NRM groups. » Collected field data for improving ground cover models to help improve reporting and develop new mapping products which quantify ground cover patchiness and land condition. » Contributed to integrated activities across Paddock to Reef, particularly with the management practices framework to improve validation of management practice information. » Contributed to setting of new ground cover targets and redesign of Paddock to Reef program for Reef 2050 WQIP. » Participated in annual Paddock to Reef information sharing events for NRM groups.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
							<p><i>Riparian Vegetation Monitoring Program</i></p> <ul style="list-style-type: none"> » Contributed to setting of new ground cover targets and redesign of Paddock to Reef program for Reef 2050 WQIP. » Commenced a scientific program to transition reporting to new satellite imagery from Landsat to Sentinel 2 satellites to improve the resolution of reporting data. <p><i>Wetland Condition Monitoring Program</i></p> <ul style="list-style-type: none"> » Delivered the first ever report card on the condition of, and the pressures on natural wetlands in the Great Barrier Reef catchments. » This report card sets the baseline condition for reporting on change for the Reef 2050 WQIP wetland target. » Participated in annual Paddock to Reef information sharing events for NRM groups. » Commenced improvements to assessment methods and prepared design options for regional scale monitoring and reporting of wetland condition. <p><i>Wetland Extent Monitoring Program</i></p> <ul style="list-style-type: none"> » Commenced the 2017 wetland extent mapping (V.5). » Improved definitions of wetland hydromodifiers to provide more detail of wetland hydrological modification. » Completed improvements in regional ecosystems mapping input data including refinement of estuarine limits in northern Reef catchments. » Commenced improvements to wetland extent and attribution mapping in the Central Queensland Coast bioregions.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Catchment loads modelling, gully mapping, Paddock to Reef support to regional NRM body components.	\$1,650,000	\$1,135,000	Annual	DNRME	<p><i>Paddock to Reef support to Regional NRM body components</i></p> <p>Targeted project to continue the Paddock to Reef Integrated Monitoring, Modelling and Reporting Program.</p> <p>Activities include data collection, management and reporting, regional liaison and regional communications. This component includes funding for the cross-regional Reef coordination.</p> <p><i>Catchment loads modelling</i></p> <p>Models are being rebuilt with the most up to date data sets including new management practice adoption data, land use, ground cover, gully maps to allow us to provide modelled load reduction estimates for the 2019 report card.</p>	<p><i>Paddock to Reef support to Regional NRM body components</i></p> <p>The achievement of this project include:</p> <ul style="list-style-type: none"> » Annual provision of management practice adoption data. » Collection of annual fertiliser and pesticide use data for relevant regional industries. » Support for the DES Reef wetlands condition monitoring program through on-ground assessment of wetlands. » Lead annual synthesis workshops and regional workshops to review and evaluate the efficacy of on-ground Reef funded activities. » Production of regional communication products to disseminate Paddock to Reef results with local stakeholders. <p><i>Catchment loads modelling</i></p> <p>Best estimate of modelled loads and associated reductions in loads to Great Barrier Reef using the latest science and input data sets.</p>
	Management practice adoption reporting.	\$470,000	\$218,220	Annual	DAF	<p>These projects supports DAF's Paddock to Reef Management Practice Adoption team to provide timely, accurate, and comprehensive data on agricultural management practice adoption in Great Barrier Reef catchments. They will provide information used to populate the Great Barrier Reef Report Card; benchmark management practice adoption for a number of agriculture industries; and develop specialised tools to facilitate improved reporting.</p>	<ul style="list-style-type: none"> » An online tool to enable estimation of water quality benefits derived from improving farm management practices in Great Barrier Reef catchments was developed. It will be released for general use in August 2018. » Water Quality Risk frameworks for grains, bananas, horticulture, grazing, and sugarcane were reviewed and endorsed by the Independent Science Panel. These will form the basis of monitoring and evaluation around farm management practice adoption investments between 2018 and 2022. » Significant progress has been made toward developing a land condition modelling method and metric with potential for use in Paddock to Reef management practice adoption benchmarking. It is intended to be used as a line of evidence in the benchmarking process. » Management practice adoption benchmarks have been revised for each industry. » Paddock to Reef Management practice adoption project re-design of the Paddock to Reef program completed for the next five years.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	<p>Monitoring, modelling, evaluation and reporting.</p> <p>*Note: This Great Barrier Reef wide program includes a component of work from the Major Integrated Projects (MIPs), and includes a Management practice adoption component which is reported in the Management practice adoption reporting item above.</p>	\$2,474,000	\$2,100,633	Additional	DES	<p>This program includes:</p> <p>Catchment modelling as part of the Paddock to Reef program estimates the effectiveness of current and alternative management practices that reduce pollutant loads.</p> <p>Paddock scale water quality monitoring of priority field trials is delivering a program of activities that will provide a continuation or expansion of the activities under the paddock monitoring and modelling component of the Paddock to Reef program. This will advance knowledge of sediment, nutrient and pesticide movement from the paddock under different management practices to evaluate their effectiveness.</p> <p>Assessments of farm management data form the basis of pollutant load reduction modelling which in turn informs the investments of the Queensland and Australian governments in the Reef 2050 Water Quality Improvement Plan.</p> <p>Lines of evidence of management practice adoption are reviewed and validated and then provided to the modellers to evaluate progress towards the targets.</p>	<p><i>Catchment modelling</i></p> <ul style="list-style-type: none"> » Catchment models are being rebuilt with the most up-to-date data inputs such as new management practice adoption data, land use, ground cover, gully maps and new science to allow us to provide modelled load reduction estimates for the 2019 next report card with improved confidence in estimates. <p><i>Paddock scale water quality monitoring including</i></p> <ul style="list-style-type: none"> » Nutrient loss in run-off from sugarcane in the Johnstone catchment, Wet Tropics. » Groundwater investigation of nutrient and pesticide loss to groundwater and surface water groundwater connectivity in the Wet Tropics – Silkwood and Mulgrave. » Comparison of management practices in sugarcane and multi-farm monitoring of a sugarcane-dominated catchment; Mackay. » A paired catchment comparison of the change from pre-European land use to grazing, and the effects of multiple grazing management practices on land condition, nutrient and sediment generation rates from small adjacent catchments in the Fitzroy Basin. » Run-off and water quality monitoring from dryland grains cropping and grazing at paddock and increasing catchment scales of a sub-catchment of the Fitzroy Basin. » Increase paddock modelling capacity, support the current paddock modelling and further development of the models. » Mapping gully erosion extent in priority Reef catchment to improve accuracy in catchment models.
	Wetland condition monitoring and water quality monitoring and modelling.	\$1,020,000	\$1,020,000	Annual and co-contribution	DES	This is DES Science's co-investment to deliver key Paddock to Reef monitoring and modelling programs and regional report card support.	<p>Projects and programs supported, and reported in this document, include:</p> <ul style="list-style-type: none"> » Great Barrier Reef catchment loads monitoring program. » Great Barrier Reef wetland condition monitoring program. » Ambient water quality monitoring. » Catchment modelling.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Ambient water quality monitoring, high resolution satellite imagery.	\$1,500,000	\$1,500,000	Annual and co-contribution	DNRME	The surface and groundwater monitoring network delivered by DNRME provides timely and reliable flow and ambient water quality data that underpins modelling tools and loads reporting within the Paddock to Reef program. The network is maintained to an ISO 9001:2015 standard. DNRME collects high resolution satellite imagery within Reef catchments that allows estimation of changes in land cover, land use change and changes in the extent of wetlands.	<ul style="list-style-type: none"> » DNRME continues to invest in high quality, high resolution satellite imagery for the state, which is instrumental in Great Barrier Reef catchment monitoring and disaster mapping. » Surface and groundwater data available was provided within agreed timeframes and quality assurance.
	Research and development improvement of water models in the Great Barrier Reef catchments through the Queensland Water Modelling Network (QWMN).	\$300,000	\$400,000	Annual and co-contribution	DES	The QWMN is a cross-agency initiative to address critical gaps in the state's water modelling capability in hydrology, groundwater and water quality and support greater use of water modelling by policy-makers and program designers.	<p>The QWMN funded key activities including:</p> <ul style="list-style-type: none"> » Enhanced the interface between agricultural systems modelling and water resource/water quality Source (pesticide and nutrient) models to inform Reef investment decisions and evaluate the effectiveness of BMP implementations. » Developed revised Queensland streambank and gully conceptual model framework, informed by an expert panel and workshop with guidance on improvements for models in Reef and other catchments. » Developed and delivered data management and visualisation to support modelling teams. » QWMN Reef Fellow (Griffith University) initiated with a focus on nutrients and sediments transport processes in gullies, riverine and wetland systems.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
	Collection, storage, access and enhancement of information that support catchment restoration and land management as well as monitoring, modelling and reporting of outcomes in Reef catchments.	\$1,070,000	\$1,070,000	Annual and co-contribution	DES	<p>This investment provides a range of foundational landscape monitoring and scientific computing infrastructure and services that underpin and support Reef programs:</p> <ul style="list-style-type: none"> » State Land Cover and Tree Study (SLATS). » Queensland satellite image archive. » Queensland Land Use Mapping Program (QLUMP). » Queensland Crop Monitoring Program » Ground cover monitoring research and development. » Soil and nutrient management for productive agriculture and ecosystems services in Reef catchments. » Decision support and improved management practices for informed nitrogen management and nutrient efficiency. » Analytical laboratory services. 	<p>Investment highlights include:</p> <ul style="list-style-type: none"> » Released the 2015–2016 SLATS report and regional and Reef catchments data summary reports. » Published to open data the 2015–2016 SLATS and 2016 state wide fire scar mapping. » Maintained high performance computing systems and satellite image archive. » Developed a crop monitoring method to inform Paddock to Reef water quality model parameterisation in the broadacre cropping regions of Reef catchments. <p>DES scientists provided additional support to Science in the Paddock, for example:</p> <ul style="list-style-type: none"> » Delivered soil constraints mapping for cropping and sugarcane areas in Reef catchments. » Continued characterisation of soil associated with gullies to support landscape restoration. » Determined the relative importance of eroded sediments as a source of nutrients to the Great Barrier Reef and developed innovative techniques to measure and model the contribution of this source of bioavailable nitrogen to the Great Barrier Reef. » Using results from several on-farm experiments, including the RP20 Burdekin District nitrogen trials, demonstrated the usefulness of a simple Nitrogen Use Efficiency indicator (tonne cane/kg applied N) to inform profitable and productive nitrogen fertiliser use with flow-on benefits for improved off-site water quality.
	Data management and delivery through Science and Spatial Information Management for Reef (SSIMR).	\$165,000	\$115,000	Annual	DNRME	Data management and delivery for SSMIR provided through Data Recording Tool for Science (DARTS) and Science and Knowledge Information Provision (SKIP) systems	<ul style="list-style-type: none"> » Support for DARTS and SKIP systems provided. Upgrades to maintain the software currency of these systems commenced.
Evaluate the effectiveness of programs, governance mechanisms and adaptations.	Develop an evaluation framework and annually evaluate and report on performance of overall Reef investment program and review governance.	\$250,000	\$206,410	Annual and additional	DES	<p>The Queensland Reef Water Quality Program Evaluation Framework has been developed to evaluate the impact; effectiveness; efficiency; appropriateness; program management; and legacy of the QRWQP.</p> <p>An annual review of the program (in 2018, 2019 and 2020) will be conducted under this framework.</p>	<ul style="list-style-type: none"> » Program evaluation framework developed and agreed. » Work toward the first annual evaluation (baseline) for 2017-2018 began in early 2018.

Overarching action	Activity within the Queensland Reef Water Quality Program	2017–2018 Planned investment	2017–2018 Expenditure	Funding source	Lead agency	Investment summary	Outcomes achieved
Report progress towards targets, objectives and outcomes.	Develop and release a Great Barrier Reef Water Quality Report Card.	\$360,000	\$367,707	Annual	DES	Develop and release a Great Barrier Reef Water Quality Report Card	» The Great Barrier Reef Report Card 2016 was released in October 2017. It outlined progress against land and catchment management targets, water quality targets and assessed the health of the inshore marine environment for the year.
Communicate regionally relevant information for management decisions and local communities.	Regional report card partnerships membership and support.	\$2,120,000	\$1,540,000	Annual	DES	<p>Funding was provided to support the continuation of the Gladstone Healthy Harbour Partnership, the Mackay–Whitsunday Healthy Rivers to Reef Partnership, the Wet Tropics Healthy Waterways Partnership and the Fitzroy Partnership for River Health. Additionally, funding was provided to develop the new Dry Tropics Healthy Waters partnership (Townsville area).</p> <p>This investment supports DES Science Division’s ambient monitoring program which assesses current and long-term trends in water quality and ecosystem health and provides estuarine and freshwater fish data to support the development of regional report cards.</p> <p>Delays in receipt of funding and recruitment resulted in unspent funds. These will be carried forward into 2018–19 and out years to support program delivery.</p>	<p>Regional report card partnerships provide local information about the health of waterways in different Reef regions. The partnerships are a collaboration of science, industry, government, community, Traditional Owners, farmers and fishers and conservation and tourism representatives, who together, have a shared vision for healthy waterways in their regions and develop annual regional waterway health and management practice report cards.</p> <p>» The Wet Tropics Healthy Waterways Partnership released the Wet Tropics 2017 report card.</p> <p>» The Mackay-Whitsunday Healthy Rivers to Reef Partnership released the 2016 report card.</p> <p>» The Fitzroy Partnership for River Health released its seventh annual report card.</p> <p>» The Gladstone Healthy Harbour Partnership released the 2017 report card.</p> <p>» Fish modelling support to assist with the monitoring of freshwater fish species and assessment of data against catchment-specific models of fish diversity.</p> <p>» Estuary water quality assessment in both the Mackay Whitsunday and Wet Tropics regions.</p>
2017-2018 program planned investment:		\$63,990,043					
2017-2018 program expenditure:		\$43,373,717					



