

BOWEN BROKEN BOGIE WATER QUALITY PROGRAM

Achievements and learnings

July 2025



Australian Government

REEF TRUST



Great Barrier
Reef Foundation

Introduction

The Great Barrier Reef is globally renowned for its intrinsic beauty, immense spatial scale, outstanding biodiversity as well as its natural, social, economic, and cultural values. A healthy and resilient Great Barrier Reef is critical to protect the vast array of ecological communities and species that inhabit coastal, marine, and terrestrial ecosystems. However, the health of the Reef is at risk from a range of factors including climate change, expanding coastal development, direct human use and poor water quality from land-based runoff.

In a bid to significantly improve the health of the Great Barrier Reef, the Reef Trust Partnership (the Partnership) – a landmark collaboration between the Australian Government’s Reef Trust and the Great Barrier Reef Foundation (the Foundation) – was awarded \$443 million to elevate and amplify efforts to build Reef resilience. As part of the Partnership, the Water Quality Program received \$199 million to address poor water quality from land-based runoff and respond to the priorities of the Reef 2050 Water Quality Improvement Plan (WQIP).



Bowen Broken Bogie Water Quality Program

The Bowen Broken Bogie Water Quality Program was one of ten regional water quality programs delivered under the Partnership between 2020 and 2025. Through the adoption of improved grazing land management practices and landscape restoration, this \$26 million program aimed to prevent 330 kilotonnes of sediment lost from grazing land from entering the Reef's waters every year.

The Bowen Broken Bogie catchments (BBB) have vulnerable soils that are hydrologically well-connected to the stream network.

The BBB covers an area of 11,718 square kilometres and contributes approximately 43 percent of the regional Burdekin River Basin sediment load.

Cattle grazing is the dominant land use covering 92% of the BBB. There are 86 grazing properties located in the BBB; 50 of these properties are larger than 2000 ha. Designated conservation areas, including a National Park and State Forest, exist in the southern ridges of the Broken River sub-catchment and there is significant open-cut coal mining around Collinsville in the Bowen River sub-catchment.

The WQIP prioritises a reduction of fine sediment from the Burdekin basin as the highest sediment management priority across all Reef catchments. The five-year BBB Water Quality Program (the Program) was delivered by two organisations implementing four on-ground projects, each with its own pollutant reduction target.

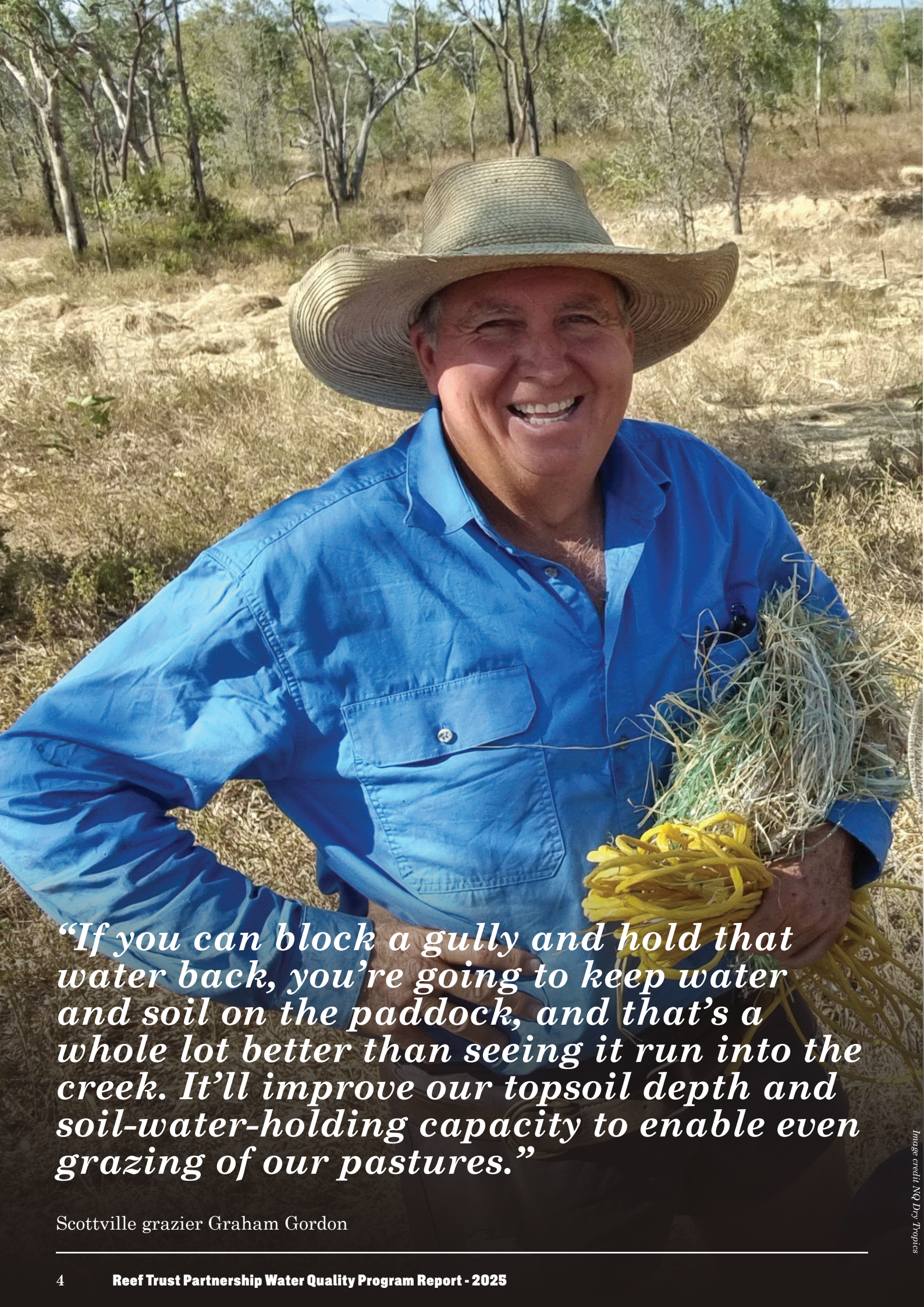
Progress to targets was tracked using the Paddock to Reef [Projector Tool](#) for fine

sediment which estimates water quality improvements based on a reported change in the management practices by graziers involved in the program. Cost-effective gully and streambank remediation sites were targeted using the [Gully and Streambank Toolbox](#) and the Gully and Streambank Erosion Control Assessment Tools for design and implementation of erosion control activities.

Activities were undertaken to mitigate fine sediment losses and improve the natural function of the landscape. Healthy landscapes provide enhanced soil water storage, better biomass production, and increased biodiversity and ground cover.

Over 40 on-ground projects positively impacted around 84,500 hectares of grazing land. The Program prevented 105 kilotonnes of fine sediment from entering the Great Barrier Reef lagoon every year through the adoption of landscape restoration activities and improved grazing land management practices.





“If you can block a gully and hold that water back, you’re going to keep water and soil on the paddock, and that’s a whole lot better than seeing it run into the creek. It’ll improve our topsoil depth and soil-water-holding capacity to enable even grazing of our pastures.”

Scottville grazier Graham Gordon

Achievements



42

information, knowledge sharing and training events



766

graziers at Regional Water Quality Program events



70

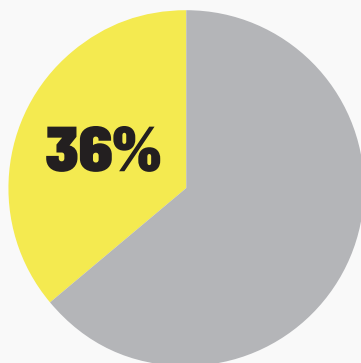
graziers (31 properties) taking direct action to improve water quality



6

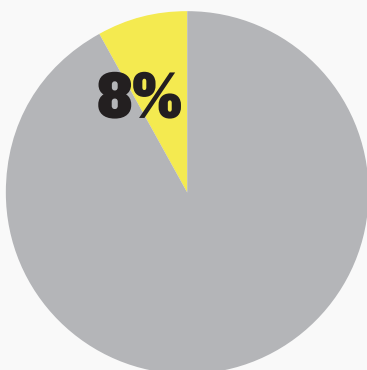
major gully networks rehabilitated and one extensive streambank

PROGRAM IMPACTS ON PRIORITY CATCHMENTS



Graziers taking direct action

Over 35% of all grazing properties in priority catchments engaged in practice changes



Hectares of improved practices

Improved practices recorded across nearly 10% of grazing area in priority catchments



84K

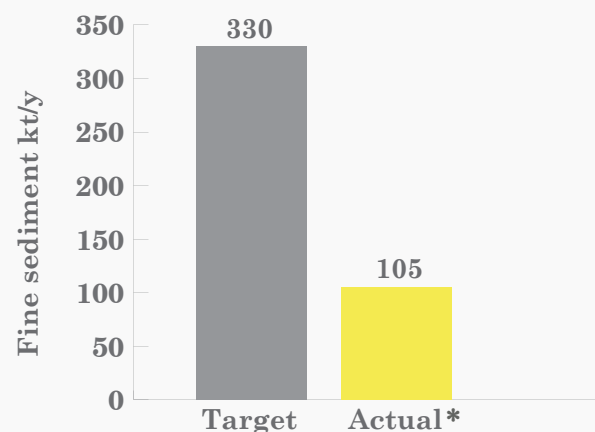
hectares of grazing land under changing management practices



42

on-ground grazing land management practice change projects

Progress against Fine Sediment reduction target



*It was identified early that there would be a significant short-fall in the regional-level sediment target set in the planning [Investment Pathways Report](#) due to disparity between sediment calculation tools and the substantial underestimation of the original costs associated with on-ground activities to meet the Program target in this region. The contracted target was met.



“I learned a lot about erosion prevention and the different solutions used to fix gully, streambank and road erosion to improve the condition of the land and reduce fine sediment flowing into waterways and out to the Great Barrier Reef.”

North Queensland Gas Pipeline Operator Cameron Jackson
with soil conservation advisor John Day (left).

Image credit NQ Dry Tropics

Bowen Broken Bogie Water Quality program

Priority catchments



Program Framework

Governance arrangements for the program ensured the projects delivering on the ground reported directly to the Foundation while being supported by a Foundation Program Manager and NQ Dry Tropics, as regional partnership coordinator.

This framework, shown in Figure 1, has increased transparency of outcomes and agility to manage contractual commitments while providing access to local support to manage risk, coordinate activities, identify synergies, and promote the program to the wider regional audience.

NQ Dry Tropics reported directly to a regional steering committee made up of key stakeholders including NQ Dry Tropics, the Queensland Government's Office of

the Great Barrier Reef, a grazing industry representative and the Foundation. The steering committee was supported by a Technical Advisory Group and the Water Quality Working Group, which provided technical and strategic advice across the whole of the Reef Trust Partnership Water Quality Program.

The design of the governance framework recognised the importance of local leadership, as well as strategic and technical guidance. A verification initiative focused on independently verifying the extent and quality of the on-ground projects which were being reported to ensure the accuracy of the spatial dashboard.

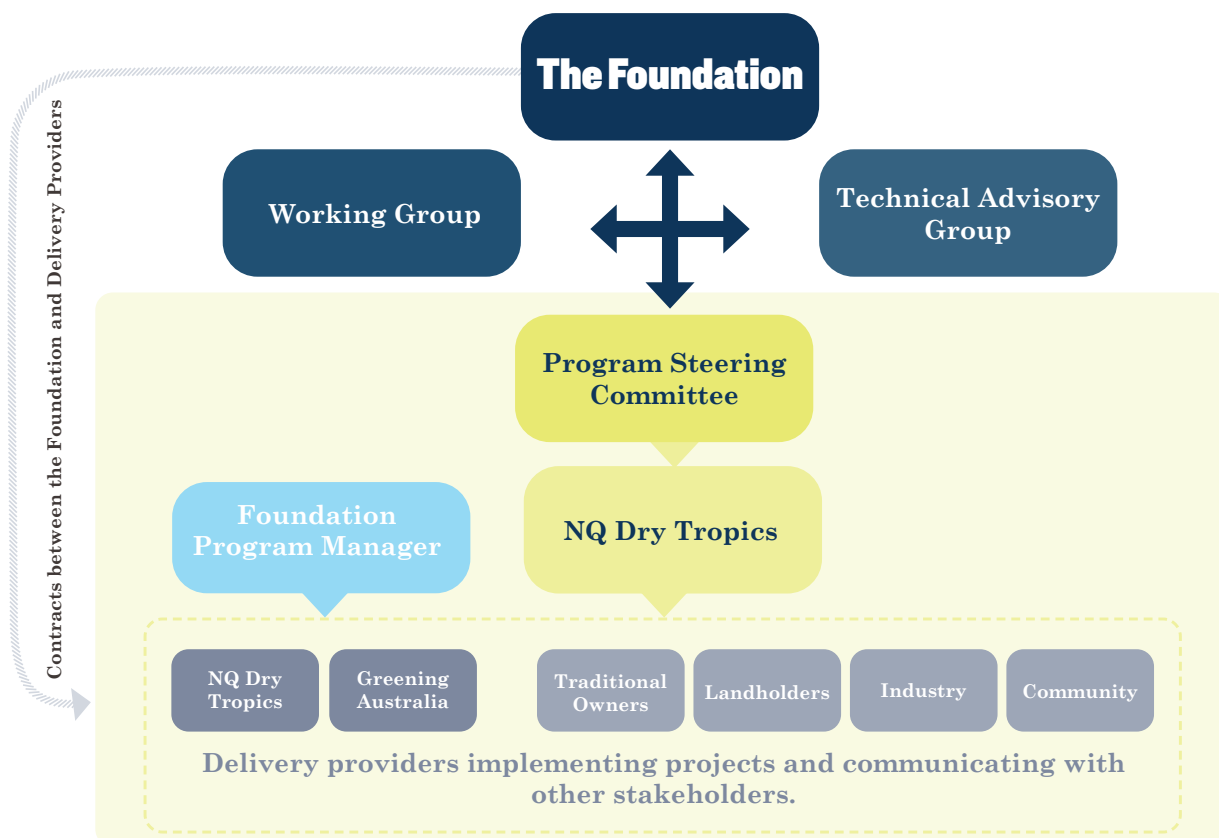


Figure 1. The BBB Water Quality Program governance framework



“The effectiveness of erosion control on a property directly affects the quality of water on the reef. We have a lot of poor soil that’s sodic, dispersive and powdery. All our efforts are geared towards keeping soil on our land and stopping it from going down the creeks and flowing into the Burdekin River.”

Scottville grazier Stan Fordham



Program Activities

All stakeholders were included in the catchment-wide approach to achieving water quality outcomes. The key activities undertaken to restore the landscape and mitigate fine sediment losses into the Great Barrier Reef lagoon included the provision of grazing land management support, remediation of strategically targeted high yielding gully networks and a degraded streambank and influencing non-grazing stakeholder groups to adopt management practices that limit their contribution to the overall sediment loads.

Landscape remediation

More than sixty percent of the fine sediment load in the BBB originates from gully erosion and the remediation or restoration of these degraded landscapes provides immediate sediment savings.

Six priority gullies and one streambank were remediated following a robust prioritisation, planning and approval process. Landscape restoration activities have reduced erosion and the amount of fine sediment impacting the Reef by nearly 19 kilotonnes per year, the equivalent of 950 dump truck loads.

Interventions including earthworks, revegetation, and strategic grazing management have resulted in improvements in vegetation cover and biomass, and soil condition reducing erosion and gully retreat rates and improving water quality as sediment is no longer being mobilised or released.

Influencing other land managers

Non-grazing land managers occupy a highly visible space and are perceived to contribute disproportionately high sediment loads despite managing less than 10% of the BBB.

Relationships and capacity were built with non-grazing stakeholders to mitigate the water quality risk associated with the development and maintenance of rural roads, pipelines, and power line easements.

Opportunities for collaboration and on-ground technical advice and design support enabled the development and adoption of best sediment management practices for long-term sustainability outcomes.

Grazing Land Management

The core grazing practices contributing to both hillslope and streambank erosion processes are intrinsically linked to stocking rates and ground cover and matching these rates to carrying capacity as well as the timing and intensity in which grazing is undertaken.

The program delivered significant investment into change management to address the root causes of poor water quality discharged from grazing land.

Grazing communities were supported to create networks and transfer information, and experiences gained during project activities. Training, extension and incentives were provided to achieve sediment savings through grazing land management practice

change. Extension officers provided one-on-one support for property management and infrastructure development planning during property visits with graziers.

Improved grazing land management practices were achieved through cost-sharing arrangements with financial incentives and grazer co-contributions used to implement the infrastructure required for lasting change management (Figure 2).

Fourty-two on-ground grazing land management practice change projects were implemented across 84,480 hectares on 31 grazing properties. Fourty-two water quality events provided new information, knowledge sharing and networking opportunities to over 700 graziers and 300 industry attendees.



Figure 2. Breakdown of financial incentives and grazer co-contributions

Funded Projects

KIRKNIE GULLY REMEDIATION

Greening Australia completed stabilisation works on three large alluvial gully networks at Kirknie Station. The extensive remediation works included reshaping, installation of bund walls, rock chutes and check dams, soil amelioration and revegetation activities, and improved grazing land management practices which have delivered a reduction in fine sediments into the adjacent Bogie and Burdekin rivers. An additional project was funded for maintenance works on the Kirknie site in 2024.



LANDHOLDERS DRIVING CHANGE

NQ Dry Tropics provided grazing services including training, extension and incentives to achieve sediment savings through grazing land management practice change.

Landscape remediation was completed on six highly erosive sites to achieve sediment savings through extensive interventions in gully and streambank erosion.

Support was provided for other land managers to achieve sediment savings through interventions in non-grazing land uses such as development and maintenance of rural roads, pipelines, and power line easements.



ACCELERATED GRAZING SUPPORT IN THE BBB

NQ Dry Tropics worked with graziers to identify opportunities for improved management practices through extension support and one-on-one property management planning.

Improved grazing land management practices were implemented with new infrastructure installed through cost-sharing arrangements with financial incentives and grazer co-contributions.

Two major gullies on Havilah Station were remediated and landscape rehydration activities were demonstrated on Weetalabah Station. Fine sediment exported from hillslope erosion to the Great Barrier Reef was reduced.





“The workshop encouraged me to think about the way my family approaches land management on our property. To hear firsthand experience with practical examples, what worked, what didn’t, and why, was insightful and helpful. It also confirmed we’re on the right track, so that was heartening.”

Charters Towers grazier Sue-Ann Jones



Image © J. James Great Barrier Reef Foundation

Belmore Downs

Twenty-six hectares of eroded gullies on Belmore Downs have been rehabilitated through the NQ Dry Tropics' Landholders Driving Change project.

This significant landscape restoration project was designed and constructed by Neilly Group Engineering. Works were completed in two stages and included a mix of land reshaping, bunds, and associated rock chutes, batter drains, porous rock check dams, soil amelioration, fencing, revegetation, and grazing management.

"Remediation works were designed to be cost-effective while improving the resilience of the landscape into the future, with the works being designed to withstand up to 1 in 50-year rainfall events", said James Allen, Principal Environmental Engineer at Neilly Group Engineering.

Earthworks reshaped active alluvial gullies. Bunds were installed to divert the overland flow that was contributing to gully head erosion and direct flows into armored rock chutes. Porous rock check dams were installed throughout the gully network to slow

erosive flows and allow for soil deposition. Rigorous soil testing was completed to identify the deficiencies in soil chemistry that are contributing to erosion and the identify the required amelioration.

NQ Dry Tropics Civil Works Coordinator Damian Flintham said the construction process ran smoothly.

"It was a pleasure working on Belmore Station with Neilly Group as they are very professional in how they program and deliver a project," said Damian.

Disturbed areas were revegetated with native plants and grasses based on ecological assessment of the site. Healthy levels of groundcover reduce erosion risk and improve soil health and water holding capacity for resilient landscapes.

The result is an estimated 5,703 tonnes of fine sediment (the equivalent of 285 dump trucks worth) annually stopped from entering local waterways and ultimately, the Great Barrier Reef lagoon.

Belmore Downs Gully 1



Image Neilly Group Engineering

2023



Image Neilly Group Engineering

2024

Belmore Downs Gully 3



Image Neilly Group Engineering

2023

Image Neilly Group Engineering

2024

Belmore Downs Gully 5



Image Neilly Group Engineering

2023



Image Neilly Group Engineering

2024



“We want to use spelling to improve the bulk and composition of pastures and to improve land condition. The project helped us equip an existing bore with a solar pump that provides water to several paddocks. This is helping enormously.”

White Kangaroo grazier John Skinner



Station Creek

Landscape restoration activities addressed 1800 metres of highly erosive banks on Station Creek at Havilah Station near Collinsville. Streambanks were stabilised to reduce land loss, maintain the flow of the waterway, and reduce the downstream effects of bank erosion and sediment loss.

Vertical banks were battered to a stable grade and rock chute batter drains and bunds installed to manage the entry of overland flows through multiple existing gullies. Pile fields were installed to slow down water and trap sediment, and protect and repair damaged riverbanks while revegetation occurs. Over 1900 timber piles were sourced from local contractors, acquired from State forests.

Native vegetation tube stock (2850 trees) endemic to the region was planted in the remediation area to stabilise the soil and mitigate future erosion.

A solar powered irrigation system with 2 water tanks (128,000 litres) and 13 kilometres of irrigation pipe has been installed to provide plants with a consistent water source which will be eased once plants are established.

Stock exclusion fencing has been installed to allow revegetation to establish and manage grazing pressure in the future.

The result is an estimated 9,157 tonnes of fine sediment (the equivalent of 458 dump trucks worth) annually stopped from entering local waterways and ultimately, the Great Barrier Reef lagoon.

Station Creek downstream



Image Neilly Group Engineering

2024



Image Neilly Group Engineering

2025

Station Creek upstream



Intage Neilly Group Engineering

2024

Intage Neilly Group Engineering

2025

“Workshops like this serve as a strong reminder to get out and have a look at your cattle and paddocks with your own two eyes, observe and learn, because there’s no shortcut to making positive change to improve your country and business.”

Charters Towers grazier Clancy LeFeuvre





Learnings

Grazing land management

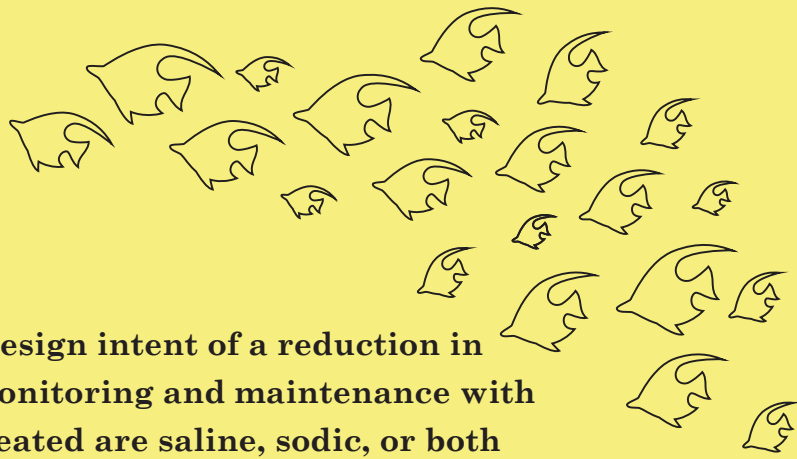
1. Investment is required to accelerate the infrastructure development for improved management practices considered in long-term planning. Provide financial incentives for grazing land and riparian management on-ground projects; incremental changes affect whole-of-system changes.
2. Practical hands-on workshops increased the digital literacy of graziers by providing training and access to useful planning tools and information on satellite internet and cloud-based storage. Provide a broad range of activities and technical advice to support ongoing learning, share ideas, and assist in planning and adoption of better practices.
3. Innovative grazing land management approaches for sediment reduction at scale need to be de-risked. Provide well-supported project planning and project development (e.g. training, technical/property planning advice), particularly for whole-of-property planning which can accrue high, immediate, program returns.
4. An increasing number of landholders have full/part-time off-farm employment impacting on attendance at engagement and learning opportunities. Offer learning opportunities and extension activities on weekends.
5. While exclusion fencing is installed to protect the streambank from livestock induced erosion, livestock exclusion may not be the desired landholder management action for riparian areas. Agree to clear management requirements (maintaining streambank stability, water quality and land condition objectives, while satisfying property management needs, like access as part of a grazing rotation or for hazard reduction) and articulate in contracts.
6. Interpersonal skills and a thorough understanding of grazing systems are required to translate program objectives into projects which practically work for a specific grazing system while achieving water quality outcomes. Provide support and training for field officers to build a solid understanding of grazing systems and program outcomes.

Detailed learnings:

- [Grazing Land Management Learnings and Recommendations Report \(Kerr, 2024\)](#)
- [Landscape Remediation Learnings and Recommendations Report \(Landloch, 2025\)](#)

Learnings

Landscape restoration



7. Maintenance is required to meet the design intent of a reduction in sediment lost. Include provision for monitoring and maintenance with longer periods where soil materials treated are saline, sodic, or both (gullies 10 -20 years, streambanks 5 -10 years).
8. Potential problem areas cannot be identified, or designs altered if modelling does not consider the full suite of proposed remedial works prior to design finalisation. Carry out hydraulic model runs with planned ‘works in place’ to identify any residual high-risk areas.
9. Vegetation cover is essential for erosion control. Vegetation establishment and growth is drastically reduced when infertile, saline and/or sodic subsoils are placed within the root zone. Sampling and analysis of soil materials should be carried out in accordance with CSIRO Guidelines for Surveying Soil and Land Resources (2008) at a scale of 1:5,000 or smaller.
10. Target cover levels are needed to support and inform monitoring and maintenance. Vegetation cover at or above target levels is essential for erosion control. Target levels for vegetation cover to achieve erosion control should be identified and specified. For riparian vegetation, target levels should include not only grass cover, but also tree/shrub stem density, species diversity, and vegetation height.
11. Landholders must take responsibility for grazing animal management and any other local risks, for the design life of the controls. Agreements with landholders should be based on provision of appropriate management of project areas for periods appropriate to site and prevailing risks.
12. Uncontrolled grazing can reduce surface cover, delay or reduce establishment of trees and shrubs, develop cattle tracks to channel overland flows and create low points over diversion banks. Adequate fencing is essential and should be constructed to a standard sufficient to reliably control access by grazing animals.
13. The cost and difficulty will increase rapidly if repair works are delayed, and the reported sediment savings may not be realised. Maintenance and repairs should be carried out promptly when the need is identified, with funding being allocated for such works.

“We are more aware of what we should be looking at when we’re looking at our landscape. A great message that came out was if you mess something up, learn from it, don’t repeat it. That’s good advice.”

Bowen grazier Jocelyn Gordon (pictured right)



Summary

Over the four years of the Reef Trust Partnership Water Quality Program, 70 graziers improved grazing land management practices on 31 properties increasing productivity and sustainability on around 85,000 hectares in the Bowen Broken Bogie catchments.

Program activities centred around the development of property plans and tailored extension support for the adoption of improved grazing land management practices. Activities were undertaken to restore the landscape and mitigate fine sediment losses to improve the natural function of the landscape which enhanced soil water storage, produced better biomass, and increased biodiversity and ground cover.

Transparency and accountability were delivered through a regional-specific governance model. Real-time data of on-ground actions provided timely and public progress towards pollutant reduction targets. Incentives removed the financial barriers to the timely adoption of best management practices. A robust verification process of on-ground projects has contributed to strengthened regional stewardship and enduring outcomes.

A combination of one-on-one extension, peer-to-peer activities, group learning, property management planning, financial incentives for targeted on-ground works, and landscape remediation contributed to the reduction of 105 kilotonnes of fine sediment per year. This has resulted in better water quality in local waterways and the Great Barrier Reef lagoon.





Acknowledgements

Reef Traditional Owners have been caring for land and sea Country for more than 60,000 years, using Traditional Knowledge passed down through ancestral lines for millennia. The Great Barrier Reef Foundation extends its deepest respect and recognition to all Traditional Owners of the Great Barrier Reef and its catchments, as First Nations People, holding the hopes, dreams, traditions and cultures of the reef.

The Bowen Broken Bogie Regional Water Quality Program was funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation.

Cover image: Great Barrier Reef, Australia by Gary Rugli (RugliG Photographer)



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