



Fitzroy Water Quality Program

Protecting the Great Barrier Reef by reducing soil loss in the Fitzroy Region.

2020 – 2024



Great Barrier Reef Foundation



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Fitzroy Basin Association acknowledges the Traditional Custodians of the land where we work and live, and their enduring efforts to care for country. We pay our respects to Elders, past and present, as well as to the emerging leaders of all First Nations representing land and sea within the Fitzroy Region.



Fitzroy Water Quality Program

The Fitzroy Water Quality Program aimed to stop 50,000 tonnes of fine sediment from the Fitzroy River basin entering the Reef's waters every year.

This \$19.6 million investment under the Reef Trust Partnership supported a series of projects focussed on improving landscape function through remediation of degraded land, including gullies and streambanks and improving land management, particularly of grazing and cropping lands. The program has wrapped up as of June 2024.

FBA was appointed by the Great Barrier Reef Foundation as the regional partnership coordinator for the program. In that role, FBA has lead coordination between the on-ground projects, as well as engagement with landholders and other stakeholders in the region.



Great Barrier
Reef Foundation



The Fitzroy Water Quality Program is supported by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation, Fitzroy Basin Association, Greening Australia, Verterra and Catchment Solutions.



Lower Fitzroy Streambank Stabilisation Project

FITZROY RIVER
AT YAAMBA



“We are extremely grateful for the opportunity to be a part of protecting the Great Barrier Reef with sediment reduction. The entire staff at FBA were amazing to work with.”

Bill Kirkwood
Property Owner



43,000 tonnes*
sediment savings
annually



Over \$4 million



June 2021 –
December 2022



Aim

Stabilise 900m of the Fitzroy River which is estimated to have lost 515,000 tonnes of sediment between 2008 and 2020. Since 1952, the bank has retreated 180m.

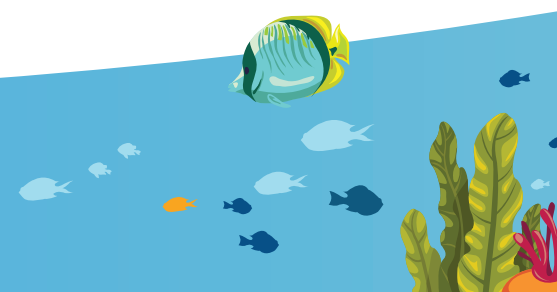
Works Summary

- Aerial survey 2020
- Site works and engineering design
- 110,000m³ soil excavation, overburden used to create a raised paddock for stock safety in future floods. 28,000m³ of topsoil stripped, stockpiled and spread back
- 1,352 log piles
- 3,500 tonnes of rock for chutes and 300 tonnes for rock beaching
- 10,000 native plantings sourced from local council nurseries (sedges, grasses, rushes and trees)
- 1.3km stock exclusion fencing
- Civil works completed October 2021 and fast establishing cover crop sowed before 2021 wet season

Outcomes

- 900m of riverbank stabilised by bank battering and diverting overland flow to rock chutes
- 43,000 tonnes* of sediments (including 23,000 tonnes fine sediment) saved from entering the Fitzroy River
- Nesting habitat protected for critically endangered White-throated Snapping Turtle and Fitzroy River Turtle
- At least 25 locals upskilled
- 94 jobs created in the region, excluding (7) FBA staff
- Collaboration between local suppliers and contractors
- High flood event cattle retreat with water and feed
- Improved resilience for the local ecosystem
- Over \$200,000 of specialised machinery secured in the region
- Improved pest management

* Source: modelling from endorsed project site reports





The People Behind the Project

Erosion Site Identified

Watching his property slowly be claimed by the river was the upsetting reality for Bill Kirkwood. With 180m of land lost, and 515,000 tonnes of sediment washed down the river, it was no small victory for Bill, Fitzroy Basin Association (FBA) and the Reef getting this loss under control.

Clear Results

By stabilising the riverbank on this property, the future is not only looking up for Bill, but also his animals, local ecosystems and river turtles. The future of the Reef is looking dramatically less murky with an estimated 23,000 tonnes of fine sediment saved from entering the Fitzroy River every year. When sediment enters the Reef it creates turbidity which leads to reduced light for seagrasses and coral which can reduce their growth and affect their reproduction and early development along with creating other implications.

Safeguarded Futures

Daniel Boshoff FBA's NRM Manager worked closely on this project and noted that, "everyone has a role to play in protecting the Reef. Land managers who reduce sediment run-off to improve waterway and reef health are helping to create long term benefits for everyone in the Fitzroy region."

"This project is a big win for the Reef and the property owner. It has increased Bill's productivity and sustainability while also improving the landscape's function. The multi-faceted project is a great example of what can be achieved with great regional knowledge and focused collective power. We look forward to what's next."

*Daniel Boshoff
FBA's NRM Manager*



Grazing Practices Create Positive Change

SOUTH YAAMBA, ALTON DOWNS, CANOONA & MORINISH SOUTH



“We’re really optimistic about this project. The landholders were on board right from the start and the results speak for themselves. Along the river has improved and we can see the difference between the fenced and non-fenced areas. Another win is that the landholders are making small changes to how they run their entire properties, not just the zones near the river.”

Braden Mitchell
FBA Waterway Management Coordinator



8,372 tonnes of fine sediment reduced per year through riparian fencing and grazing land management improvements



Steve and Claire Farmer's property, Mt Elsa

Aim

This project aims to improve riparian zones, implement practice change and complete erosion control activities to allow ground cover to regenerate. Properties with poor land conditions or eroding riverbanks can be large contributors to sediment entering the Great Barrier Reef, which can damage precious marine ecosystems.

Works Summary

- Five graziers on properties bordering the Fitzroy River participated
- A total of 5.45km fencing installed along the riparian zones
- All sites supplied with water by FBA, including troughs and a dam constructed at one of the more remote locations to offer a permanent water source for cattle
- Land Management Plans put in place across all sites to reduce grazing pressure and encourage ground cover

Project Outcomes

- 8,372 tonnes of fine sediment reduced per year through fencing and control of cattle access to the river
- Land management improvement through practice change



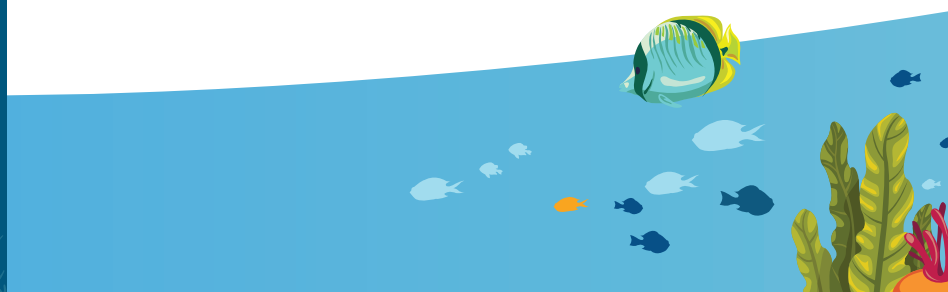
Water tanks



Water infrastructure



Water troughs





5.45km fencing installed along riparian zones

The People Behind the Project

For Steve and Claire Farmer, signing up to work with FBA for the Fitzroy Water Quality Project was about taking a holistic approach to their grazing business.

Aiming for a productive, profitable and sustainable operation, it wasn't the first time the Farmer's have partnered with FBA in developing their land.

Steve and Claire recently bought a new property next door to their 4,300ha grazing property Mt Elsa, Canoona and reached out to FBA when they were looking at options for fencing and water on the property.

That's when they became aware of the Fitzroy Water Quality Project, funded by the Great Barrier Reef Foundation.

Steve and Claire worked with FBA staff to develop a land management plan and to arrange appropriate fencing along the river to prevent cattle from grazing the riparian zone and causing erosion to the banks of the river.

“Taking a more holistic approach helps the business but it also helps the environment at the same time,” Steve said.

Steve and Claire had three kilometers of fencing installed and a range of water supply sources, such as troughs and tanks, for their cattle.

“There was insufficient fencing or water infrastructure on the property, so the project allowed us to split it up and manage the pasture, as well as manage the impacts on the riverbank at the same time.”

“Working with FBA and the contractors who did the work was a great experience and everything worked really well. We're now on track to have more ground cover and a more sustainable operation while also reducing the amount of sediment entering our waterways,” Steve said.

FBA's Waterway Management Coordinator Braden Mitchell said a key part of these projects was about supporting and empowering land managers to improve their land management.

“So it's about improving not just the riparian zones but the entire property. The physical outcome we want is more groundcover and the next outcome is the graziers adopting a more sustainable practice. We're definitely seeing that.”



Grazing Land Management Project

FITZROY RIVER
AT CALLIWEERA



“The results of this whole-of-property grazing land management project speaks for itself. The sustainability of the landscape has been greatly improved and it has been a pleasure working with landholders who understand that public and environmental benefits can be achieved through their actions,”

Dave Waterson
Verterra



17,821 tonnes of fine sediment reduced through whole of property grazing land management improvement



1,789 tonnes of fine sediment reduced through gully rehabilitation



August 2021 –
November 2023



Diversion bank earthworks

Aim

Verterra, Australia’s first full service Ecological Engineering Company, aims to reduce sediment runoff and repair landscapes in the Fitzroy Catchment through grazing land management practice change and gully remediation. Properties with poor land conditions or eroding gullies can be large contributors to sediment entering the Great Barrier Reef, which can damage precious marine ecosystems.

Works Summary

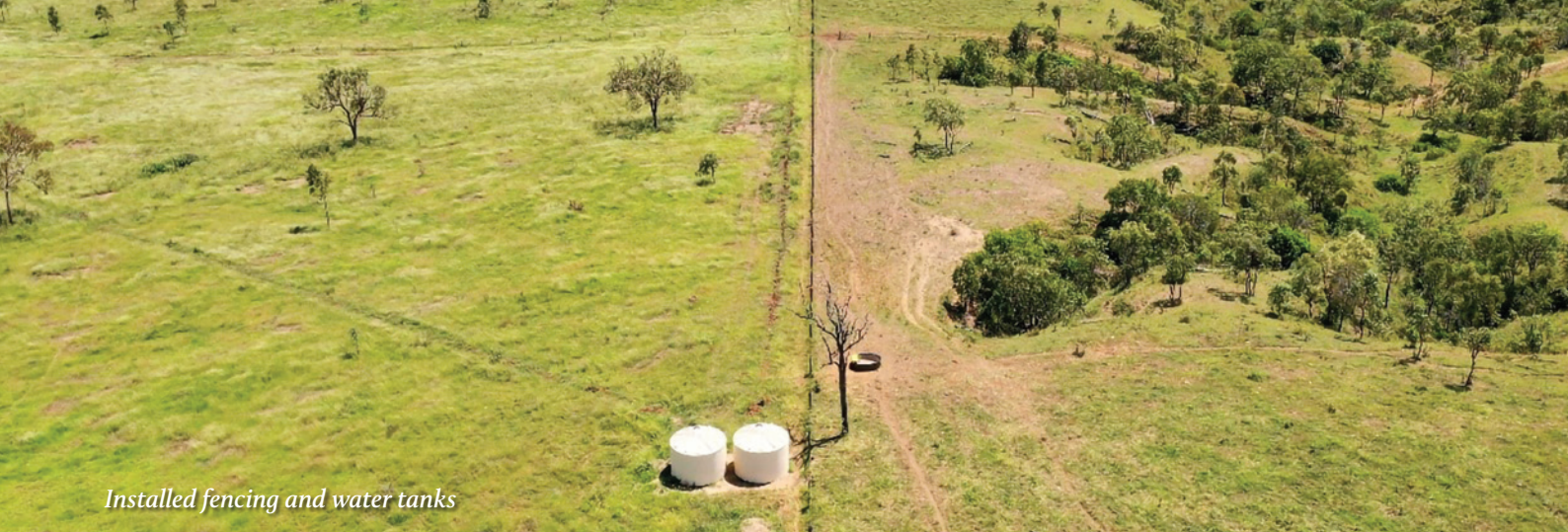
- Four landholders were engaged to undertake improved grazing land management practices
- One landholder was engaged to rehabilitate two gullies flowing directly into the Fitzroy River
- 956ha of pastures were improved
- Installation of:
 - 204km new fencing
 - 74 gates
 - 50 water tanks
 - 134 water troughs
 - 109km underground polypipe
 - 18 solar pumps
 - 5 gully rock chutes

Project Outcomes

- 17,821 tonnes of fine sediment reduced through whole-of-property grazing land management improvement
- 1,789 tonnes of fine sediment reduced through gully rehabilitation



Underground polypipe installation



Installed fencing and water tanks

The People Behind the Project

Productive, profitable and sustainable land was the name of the game for father and son Mark and Nathan Warnock when they signed up to work with Verterra as part of the Fitzroy Water Quality Project (FWQP), funded by the Great Barrier Reef Foundation (GBRF) in August 2021.

Their 3,500ha property Calliweera is located approximately 40km northwest of Rockhampton in the Fitzroy River catchment. The property, adjacent to the Fitzroy River, was experiencing high amounts of sediment run-off and had a history of below-average ground cover.

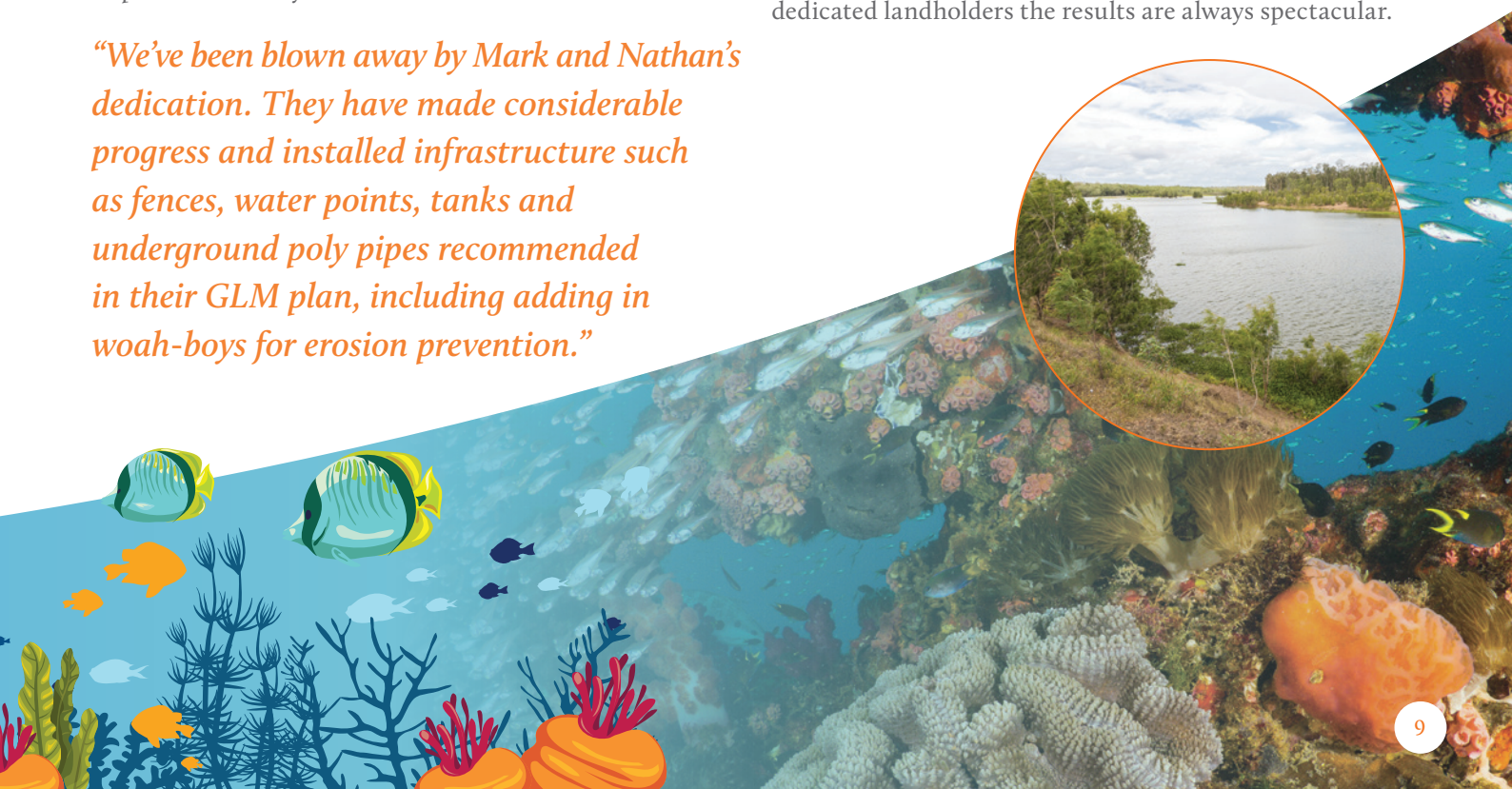
In consultation with Mark and Nathan, Verterra undertook a detailed assessment across the property and consequently developed a whole of property Grazing Land Management (GLM) plan, that aimed to reduce 2,600 tonnes of sediment run-off from the property each year.

Verterra Project Lead Andrew Yates has been impressed with Mark and Nathan's perseverance and the improvements they have made to date.

“We’ve been blown away by Mark and Nathan’s dedication. They have made considerable progress and installed infrastructure such as fences, water points, tanks and underground poly pipes recommended in their GLM plan, including adding in woah-boys for erosion prevention.”

“The focus of the GLM plan aligns with their vision to improve land condition on Calliweera. The project has shown that the hard work has been worth it as they are already seeing benefits such as improved pasture, higher productivity, improved soil structure, soil compaction relief, reduced erosion and an increase in soil nutrition,” Andrew said.

While continuing to make positive changes at Calliweera, Mark and Nathan are also participating in a soil carbon farming project and arranging Environmental Plantings through the Land Restoration Fund (LRF). When an opportunity arises to work with such forward-thinking, dedicated landholders the results are always spectacular.



Streambank & Gully Erosion Solutions for the Fitzroy Catchment

BOWLIN ROAD,
GAVIAL HEIGHTS STATION
A 1,400 hectare grazing and cropping property



*Streambank following revegetation
(April 2024)*

Aim

The Bowlin Road site, 5km from the Rockhampton CBD within the tidal estuary of the Fitzroy River, is one of four sites completed by Catchment Solutions, as part of the Fitzroy Water Quality Program. The Catchment Solutions project aimed to prevent 7,695 tonnes of sediment from leaving the Fitzroy catchment and reaching the ocean every year, with the works on this site expected to stop 4,914 tonnes of fine sediment reaching the Great Barrier Reef Lagoon per year.

- The streambank of the Fitzroy River was eroding at a rate of two metres per year and had resulted in the loss of parts of the Bowlin Road and adjacent private property
- Erosion was occurring due to tidal scour, boat wash and flood events
- Total erosion rate of 12,478 tonnes/year

Works Summary

- The restoration approach involved reprofiling the streambank, installation of log fillet erosion control structures, rock beaching and revegetation
- Earthworks were completed in late 2022 with revegetation completed early 2024
- 53 log fillet structures installed to control tidal scour and erosion from boat wash
- 450 mangroves planted from locally sourced seedlings
- 2,872 riparian tubestock planted
- 668 metres of stock exclusion fencing installed

Project Outcomes

- Approximately 680 metres of streambank was restored
- Natural recruitment of mangroves in very high numbers, contributing to long term stability of the bank.
- Considerable volume of asbestos waste from illegal dumping was uncovered during works. The asbestos containing material was isolated during earthworks.

53

53 log fillet structures installed



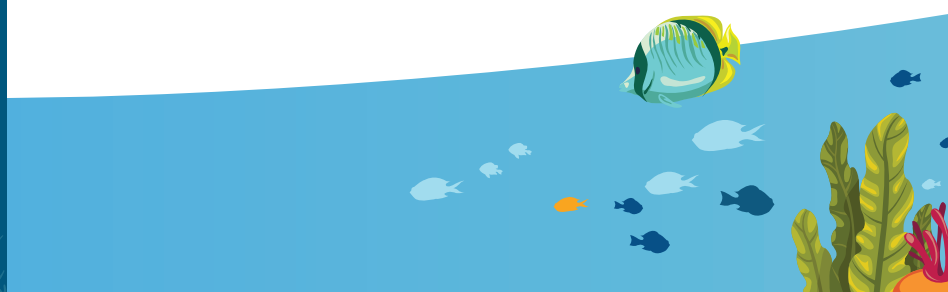
Approximately 680 metres of streambank restored



450 mangroves planted from locally sourced seedlings



2,872 riparian tubestock planted





Streambank prior to restoration in 2021. Note the absence of mangroves and riparian vegetation.



Bank battering and installation of log fillets in late 2022



Bank battering and installation of log fillets in late 2022



Natural mangrove recruitment following installation of log fillet structures.



Grazing Land Management Project

MACKENZIE & DAWSON RIVERS



“The success of the project was seen through the improved land management practices and conditions, but more importantly in the confidence and education of those who have always worked on and with the land – the Traditional Owners. Sharing knowledge and education with the Traditional Owners of this country has been both humbling and enlightening. Traditional landscape understanding has been paired with modern sustainable grazing to really see the land, people and cattle thrive through this project.”

Xanthe Willis
Greening Australia



Project duration:
August 2021 – May 2024



Property size:
42,890 hectares



Sediment saved:
1,164 tonnes/year



On-country discussions with partners
Photo: Mad Dog Productions

Aim

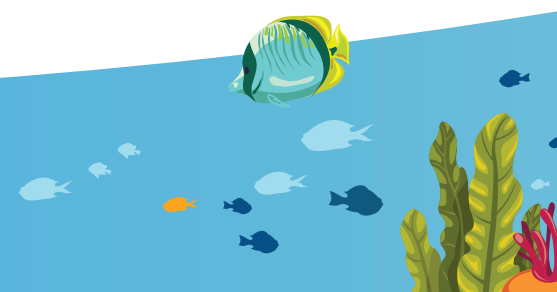
Greening Australia works to restore and protect Australian ecosystems and establish healthy, productive landscapes where people and nature thrive. In the Fitzroy region, cattle grazing and the health of the Great Barrier Reef are closely linked. Grazing practices can impact water quality through sediment runoff into nearby creeks and rivers that run out to the Reef. Through linking traditional understanding of the landscape features and cycles with modern grazing techniques, this project aimed to repair the land condition and in turn improve the quality of water reaching the Great Barrier Reef.

Works Summary

- 51 landholders in the Mackenzie catchment invited to partner with Greening Australia on the project.
- 575 hours of training and education provided to the Woorabinda Pastoral Company staff and the Woorabinda Rangers.
- 37,656 hectares of grazing land in the Mackenzie and Dawson River catchments now improving under a regenerative grazing Property Management Plan.
- A further 5,234 hectares of cropping country being shifted to a more regenerative approach.
- 5 km of riverine protection fencing has been installed along the Mackenzie River.
- 8 km of internal fencing installed to reintroduce rotational grazing.
- 56 km of barb wire installed as part of the project and 2,100 star pickets.
- 4 concrete water troughs installed to encourage cattle movement and decrease grazing pressure.
- 400 m of poly pipe installed to connect water points.

Project Outcomes

- 1,164 tonnes of fine sediment have been prevented from reaching the Great Barrier Reef annually.
- More than 20 indigenous representatives joined the project to learn about regenerative grazing to repair Country and improve water quality while sharing their own experiences and knowledge of the land.





BEFORE



AFTER

*These photos show the improvement in land condition over the project.
Photos: Greening Australia*

The Story

Woorabinda Pastoral Company (WPC) has a long history of grazing and farming in Central Queensland. CEO Tim Thomson identified a need to realign management practices to best practice approaches that would enable WPC to move forward with healthy country to produce healthy cattle. Through this identified need, a partnership with Greening Australia began on the Mackenzie Water Quality Project.

Beginning with a baseline assessment of the current Property Management Plan and a deep dive into the current business vision, land capacity, and stock management, Greening Australia and WPC started to formulate the best possible way to achieve lasting water quality improvements in the Mackenzie River and Dawson River catchments.

WPC has implemented rotational grazing practices and stronger herd management, through education and ongoing coaching to assist with implementing the changes. These practices were supported with on-ground works including internal fencing to provide more paddocks to rotate through, providing additional watering points to spread out grazing, and closing off the last section of stock access to the Mackenzie River banks.

The dedication and input from the ground up at WPC has been impressive. Managing 38,000 hectares of land requires an army of staff and the dedication they have to seeing the practices continue into the future has been remarkable. Most of the staff are local Traditional Owners, invested in looking after Country and the wider connections across the region. Traditional knowledge of the land directly compliments more modern farming practices that are coming to recognise the interconnectedness between the land, water and animals; an aspect traditional knowledge has understood for over 60,000 years.

Right: Healthy country for healthy cattle.



Photo: Mad Dog Productions



Riparian Zone Fencing in Central Queensland

A riparian zone is the vegetated land alongside a creek or river.

Riparian land is highly valuable as it has productive soils that effectively hold moisture. As a result, riparian land is often cleared and used by cattle as a preferred food source, while the waterway serves as a water source. Over-utilisation of this highly fragile zone can lead to erosion, causing a loss of valuable and productive land.

Riparian fencing, combined with good land management practices, is an effective tool to control and prevention erosion and gully formation as well as soil loss.

How to Fence your Riparian Zone

It is important to consider the impacts of water flow, soil types, the size of the catchment and vegetation before fencing.

How wide does it need to be?

Riparian zone fences should be a minimum of 10 metres from the top of the stream bank, plus the height of the highest point of the bank.

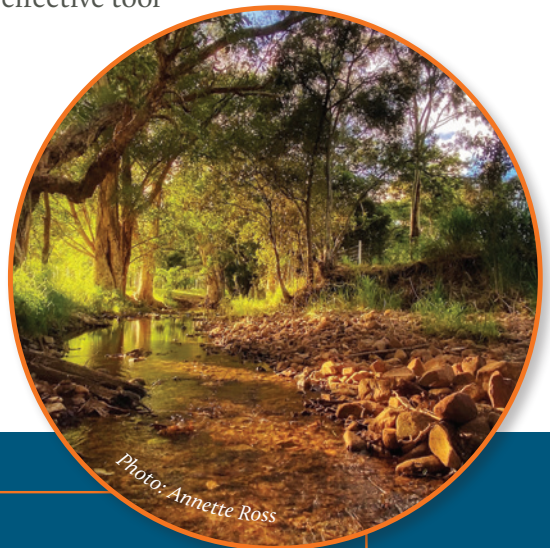


Photo: Annette Ross

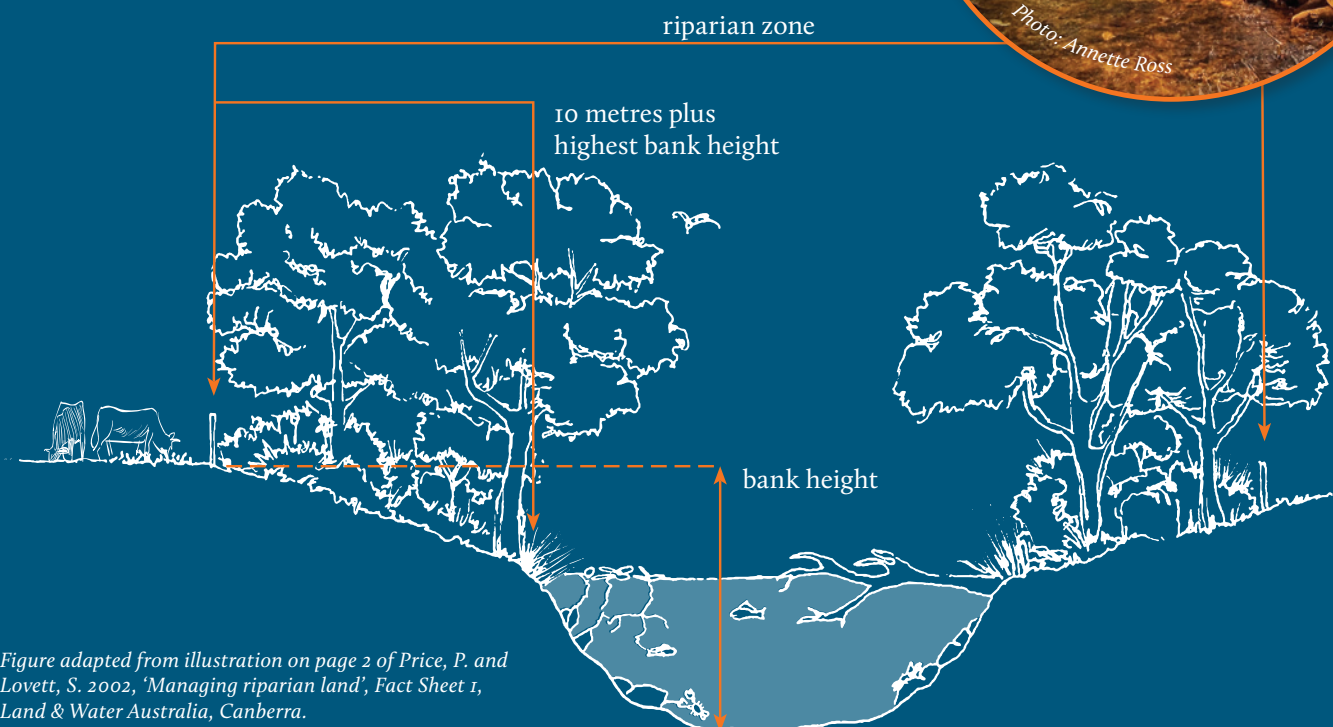
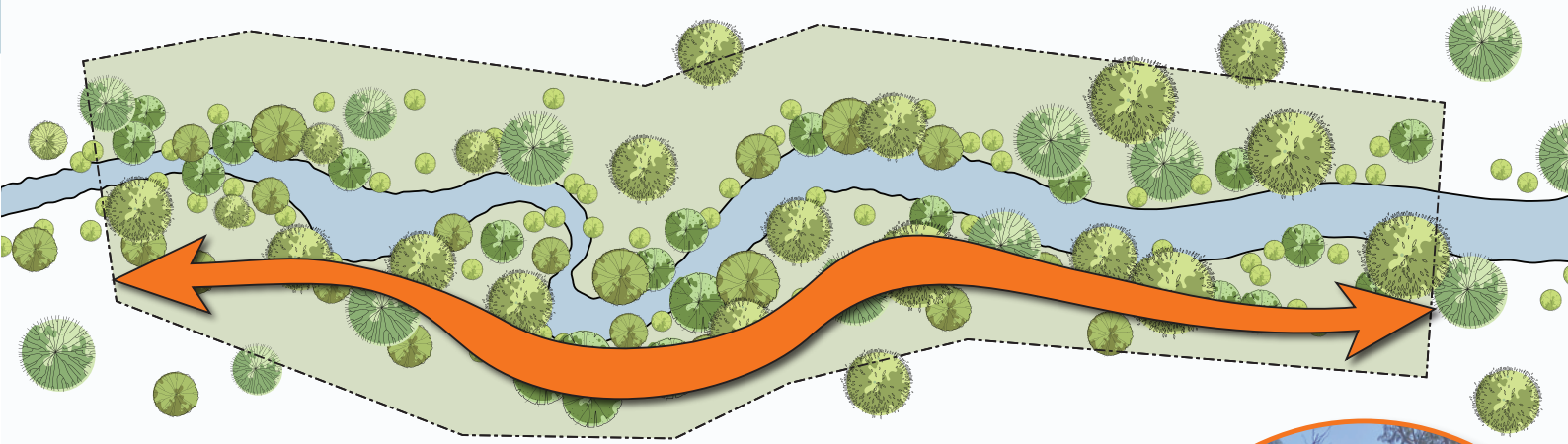


Figure adapted from illustration on page 2 of Price, P. and Lovett, S. 2002, 'Managing riparian land', Fact Sheet 1, Land & Water Australia, Canberra.



How long does it need to be?

The value of riparian vegetation increases with the area and length treated. Riparian vegetation is most effective in reducing erosion when the zone length is at least 1km.



How to fence for floods?

Fencing in flood-prone areas requires additional consideration. Ideally fences should be designed to 'go with the flow'. Hanging, suspension, drop and laydown fences are all options designed to withstand the force of water and debris.

How to fence around gullies and drainage lines?

Fences constructed too close to, or across, active gully heads will have a limited life. Creating a buffer zone around the gully will use more material. However, the fence will last longer and potentially minimise future erosion.

Managing your Riparian Zone

Zones with riparian vegetation (trees, scrubs and grasses) have an erosion rate 85% lower compared to banks without.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/esp.1678>

Good vegetation and groundcover are key to preventing and reducing erosion. Wherever possible, maintain and increase native riparian vegetation, including when constructing fence lines.

Riparian zones need to be managed for weeds and fire risk. This can be achieved through utilising livestock in accordance with best practice grazing management.

Fencing is never set and forget. Repairs and maintenance on fences and the surrounding landscape is important.



Grazing Land Management

GLM practice change is a long-term commitment to adopting whole-of-property strategies that lead to lasting improvements in the ecological condition and sustainability of your land.

What is grazing land management?

Grazing land management (GLM) is the strategic planning of grazing practices to optimise productivity and sustainability of operations while maintaining or improving land condition. This may include:

- ✓ matching stocking rates to forage budgets (number of cattle to available pasture)
- ✓ wet season spelling (periods of rest) through rotational grazing practices
- ✓ infrastructure improvements (fencing and water trough installations).

Other objectives may include fire risk management, animal supplement requirements, pasture improvement, wetland, river or stream protection and land condition remediation.

Grazing Land Management is strategic

Developing a GLM Plan can assist in setting stocking rates, establishing forage and land condition targets, understanding the sustainability of your business, preparing for an uncertain future climate, and prioritising actions required to achieve these objectives.



Land with low groundcover, single species pasture and compacted soils = less productive pasture

Expected
Improvements



Improved multi-species pasture = more productive and resilient pasture



Benefits of Grazing Land Management implementation

Implementation of GLM practices deliver measurable economic and sustainability benefits in grazing lands across Queensland.

“Reduced stocking rates, wet season spelling and pasture improvement have a large impact on carrying capacity and gross margins.”

-Department of Agriculture Fisheries and Forestry, QLD

Developing a GLM plan and implementing practice change across your grazing operation can boost your profitability, improve productivity and sustainability, increase drought resilience, and improve the condition of your land for future generations. Improvement of land condition across reef catchments in Queensland plays a large part in reducing soil erosion and improving the quality of water flowing to the Great Barrier Reef.



Erosion Control in Tidal Rivers

Log Fillets are an innovative approach to bank stabilisation and mangrove rehabilitation using sustainable products.

The method is cost effective compared to hard engineering solutions such as rock revetments and rock fillets and offers greater environmental benefits for water quality and aquatic habitat.

This erosion control model can be replicated across tidal waterways experiencing streambank erosion.

What are Log Fillets?

Log Fillets are a form of 'soft' engineering for use in controlling streambank erosion.

Log Fillets are horizontal logs built into the streambank in the intertidal zone.

Each Log Fillet consists of three horizontal logs (tied together and placed on the ground) and four vertical timber piles (two vertical, two angled).

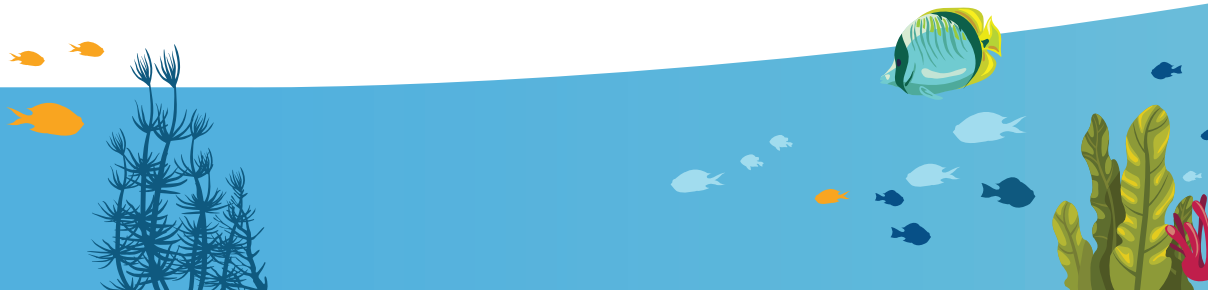
The success is in the detail

The Log Fillets are installed at Mean High Water Springs (MHWS) level, which is the long-term average of the highest high tide level.

Timber used in Log Fillets needs to be resistant to marine borers. Marine borers are wood-boring organisms that attack a variety of timber in marine and brackish environments (Australian Hardwood Class 1 or Class 2). With appropriate timber, a design life of approximately 6-7 years is expected.

From top: Streambank following revegetation (April 2024)

Bank battering and installation of log fillets in late 2022





Why is this a great solution?

Log Fillets assist with the tidal and boat wave impacts which cause streambank erosion and to provide a depositional zone for mangroves to naturally recruit.

The design life of the Log Fillets allows sufficient time for mangrove establishment. Mangroves provide the protection for long term stability of the streambank.

Log Fillet installations have been found to store Blue Carbon at 100 times the normal Blue Carbon accretion rate (Southern Cross University, 2023).

www.marine.nsw.gov.au/news-and-more/newsroom/news/2023-news/new-research-shows-bank-protection-works-reduce-erosion-and-store-carbon



From top: Streambank prior to restoration in 2021. Note the absence of mangroves and riparian vegetation.

Bank battering and installation of log fillets in late 2022

Natural mangrove recruitment following installation of log fillet structures



Rotational Grazing for a Healthy Reef

Rotational grazing is a livestock management practice where herds are moved from paddock to paddock allowing pastures to rest and regenerate between grazes.

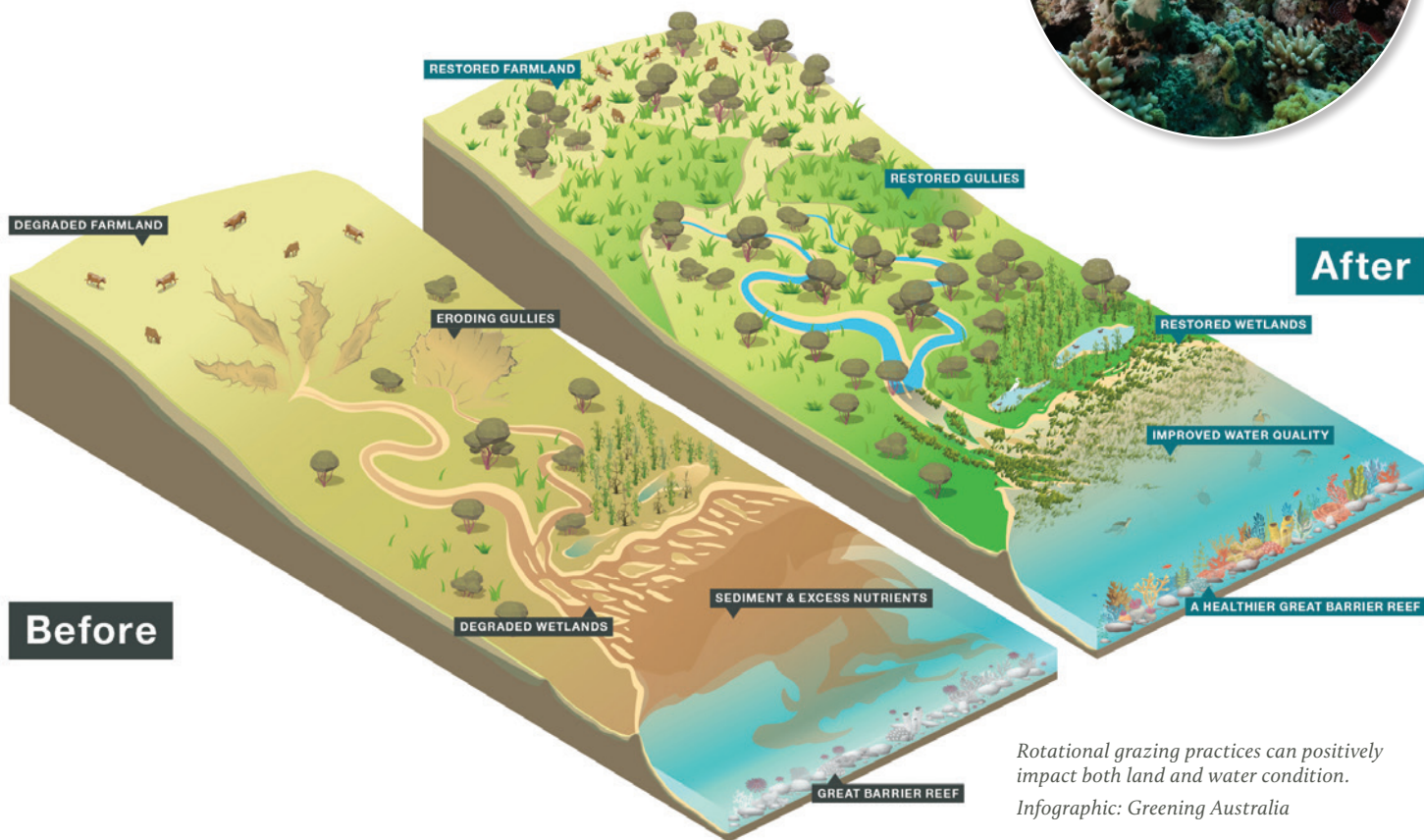
Seasonal pastures, such as those in the Fitzroy region, go through an annual cycle of growth and dormancy. It is important to take the variation of conditions over these periods into account when managing grazing, so groundcover is maintained throughout the year to support healthy cattle.

Rotational grazing can also ensure pastures remain healthy and resilient with robust root systems holding the soil in place to prevent erosion and improve runoff water quality. Keeping soil on your land and out of the creeks and rivers prevents it from reaching the Great Barrier Reef where it smothers and damages coral and seagrass meadows.



Photo: Mad Dog Productions

Top right: Aerial drone image of cattle making their way through grassy paddocks
 Right: Improving water quality supports the health and resilience of the Great Barrier Reef



Rotational grazing practices can positively impact both land and water condition.
 Infographic: Greening Australia



Rotating cattle in the Fitzroy Basin

Understanding your land size and soil type is key to understanding how many cattle you can have on rotation, and how quickly you need to move them through to maintain healthy groundcover. On the Queensland Government's Long Paddock website, landholders can find their FORAGE property report with useful information including soil erodibility (see www.longpaddock.qld.gov.au/forage). The goal is to have your soil covered and bound by grass roots all year round, preventing erosion and improving runoff water quality.

1. What's the value of rotational grazing?

There are many benefits to rotational grazing in the Fitzroy region:

- ✓ It increases the number of stock your land can support.
- ✓ It improves pasture health, biodiversity and water infiltration.
- ✓ It improves the health and weight gain of your stock as they get fresh, bulk pasture regularly.
- ✓ It reduces erosion and sediment runoff, improving water quality going into the Great Barrier Reef.

www.pasture.io/grazing-management/intensive-principles

2. How often do I rotate?

Each property, pasture, soil and cattle type is different, and these factors should be considered when planning your rotational grazing. Rest periods should be long enough to allow pasture recovery and rationed out through the dry season. Pasture grows quicker in wet warm periods, and slower in dry cool periods.

The basic rule for rotational grazing is:

Quicker growth, quicker moves. Slower growth, slower moves.

A good guide is 2 weeks of grazing and 6-8 weeks of non-grazing to allow for pasture recovery in each paddock.

www.agric.wa.gov.au/small-landholders-western-australia/rotational-grazing-small-landholders

3. How big should my paddocks be?

Paddock size is only limited by your imagination. The smaller your paddocks, the quicker your rotation needs to be. This also means its more labour intensive. The larger your paddocks, the slower your rotation can be. Aim for cattle to walk less than 1km for water within each paddock. Additional watering points may be needed to enable this as a good starting point.

4. Cycle your cattle with the seasons

There are growth (wet) and dormant (dry) cycles of pasture in the Fitzroy region. As a result, there should also be cyclical management of herd numbers to ensure pastures remain healthy and ready to respond to rainfall.

Varying herd numbers to match your pasture health will result in a much better pasture response to rain when it comes. In dry, dormant periods herd numbers should be reduced; in wet growth periods, herd numbers can be increased again.

www.rcsaustralia.com.au/rcs-regenerative-grazing-principles/

Read about a rotational grazing project in the Fitzroy region



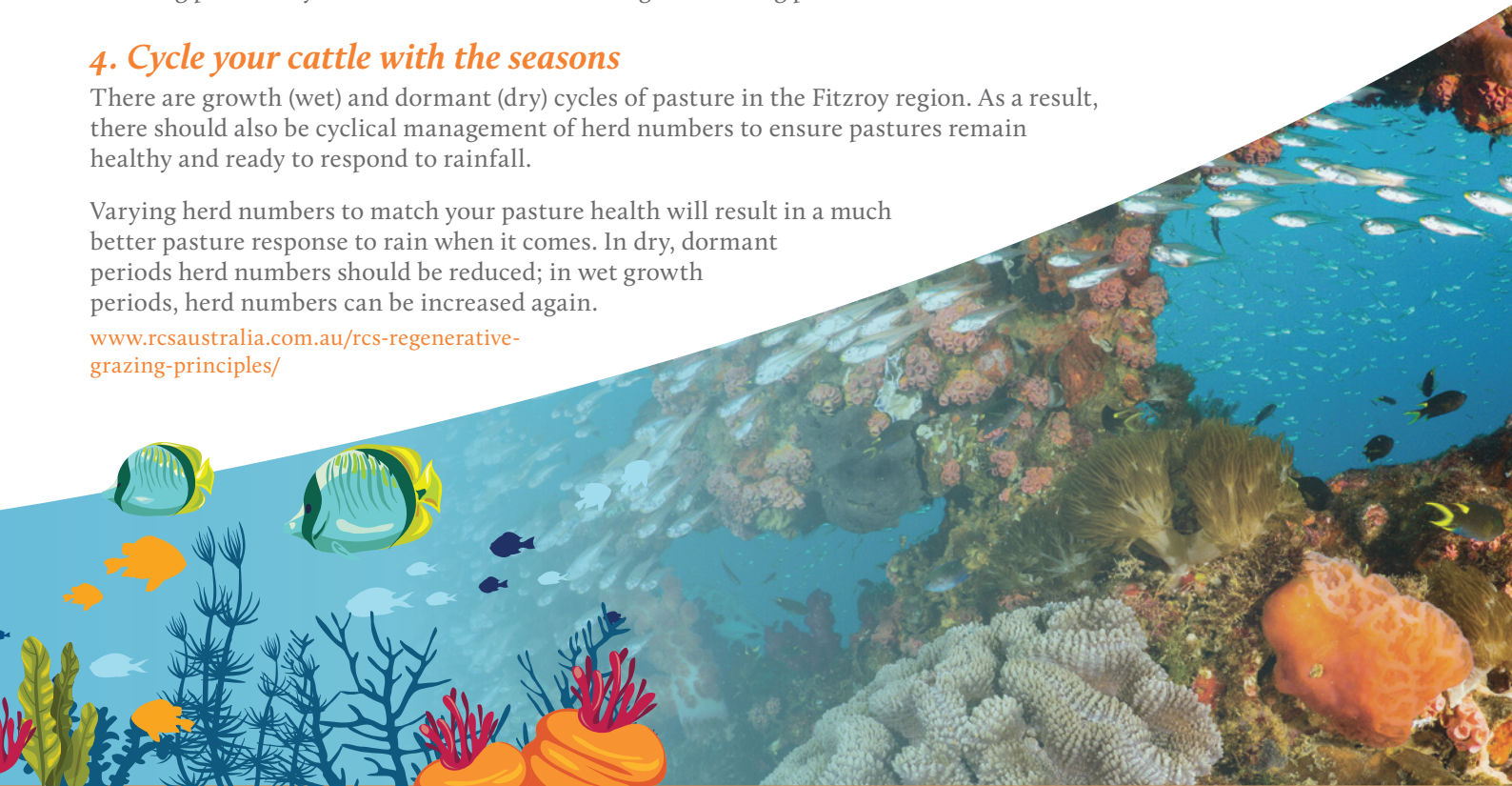
Photo: Mad Dog Products

Top right: Lawson Woodard, Stock Manager at Woerabinda Pastoral Company, inspecting grass growth in the rotational grazing paddocks

Right: Improving pasture and maintaining groundcover helps reduce sediment plumes like this from rivers flowing into the Reef lagoon



Photo: Greening Australia





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