

30 September 2024

Reef Policy
Office of the Great Barrier Reef and World Heritage
Department of Environment, Science and Innovation
Email to: officeoftheGBR@des.qld.gov.au

Subject: Reef WQIP review – Property Rights Australia submission

Property Rights Australia PRA is a not-for-profit, apolitical organisation representing agricultural and rural businesses striving for ecologically and economically sustainable natural resource management, whilst protecting private property rights. PRA wants to ensure government policies and natural resource management decisions are based on sound science and responsible economic management. PRA was formed in 2003, over 20 years ago. Reef Protection Policy and Regulations is of interest to our organisation and members. It is paramount to achieve a balance between mandatory record-keeping and required actions imposed on commercial operations in Reef catchments with evidence of improved Reef water quality and a healthy Reef. PRA's submission provides constructive feedback to the Reef Water Quality Improvement Plan [WQIP] review to achieve a sustainable balance between agricultural, food-producing landscapes and the adjacent Great Barrier Reef.

1. Who really manages the Reef?

UNESCO pulls the strings for Great Barrier Reef management, not evidence-based science as the basis of Reef policy decisions. Australian and Queensland Governments heed UNESCO desires, rather than basing management on all the expert Reef science funded by government programs. UNESCO's threat of listing the Reef in danger has the Australian and Queensland Governments squirming about potentially losing urban votes. Federal Environment Minister Tanya Plibersek's pledge to UNESCO in 2023 reflects what the World Heritage Committee wanted the Australian Government to say and does not reflect the current good health status of the Reef with record hard coral cover.

Government pledges to UNESCO include increased enforcement of Reef compliance programs, more expensive gully repairs, ban gill net fishing, cancel dam projects, and impose further restrictions on land clearing in high value regrowth and remnant vegetation areas. Governments are endorsing actions to shrink agricultural and fishing industries in Reef regions, while giving the green light to establishing massive renewable energy projects and hydro-energy storage dams, regardless of their footprint and environmental impacts and runoff across Reef catchments.

The Reef is a political, emotional playground and the subject of activism. Australia and Queensland should be celebrating record high coral cover and the Reef's excellent condition. Instead, governments continue to point their misinformed finger at rural communities, farmers and fishers in the Reef regions and shrink their opportunities for viable, sustainable livelihoods adjacent to the Reef. Meanwhile, government unfairly turns a blind eye to the land clearing, ground cover disturbance and erosion risk from 100 renewable energy development sites approved for installation across Reef catchments. This plethora of land disturbance is exempt from Reef Protection and Vegetation Management regulations and not included in the Reef WQIP nor have any imposed water quality or ground cover targets.

(2) Managing woody vegetation in Reef catchments

Land clearing in Reef catchments is being used as an emotive ploy, rather than relying on evidence-based policy based on new Reef science that shows gullies are highest risk for sediment runoff. Land managers do not clear gullies. Conservationists continually try to link Reef health to woody vegetation cover and cherry pick land clearing data and quote it out of context.

Currently, the Reef and associated catchments are all in good condition, mainly due to above average rainfall, minimal cyclones and floods and average sea temperatures. The real Reef facts are: -

- (a) Hard coral cover is the highest ever recorded across northern and central Reefs, according to 37 years of surveys published by the Great Barrier Reef Marine Park Authority <https://www2.gbrmpa.gov.au/our-work/reef-snapshot>. Figure 1.
- (b) Published scientific papers from CSIRO confirm gully erosion is the dominant source of fine sediment affecting water quality, not land clearing. <https://www.csiro.au/en/news/all/articles/2018/october/land-management-and-reef>.
- (c) Research from the federal National Environmental Science Program [NESP] confirms only a small portion of fine sediment reaches coral reefs and seagrass meadows, with most sediment flocculating out of suspension in the river deltas <https://nesptropical.edu.au/index.php/reducing-sediment-runoff-to-the-reef/>.
- (d) Conservation activists use the annual Statewide Landcover and Trees Study [SLATS] data out of context. Clearing woody vegetation is like gardening. Reef landscapes require active management across variable seasons to maintain a tree-grass-ground cover balance and control woody weeds. Woody vegetation occupies approximately 28million hectares or 66 per cent of the Great Barrier Reef catchment's total area of 42million ha.

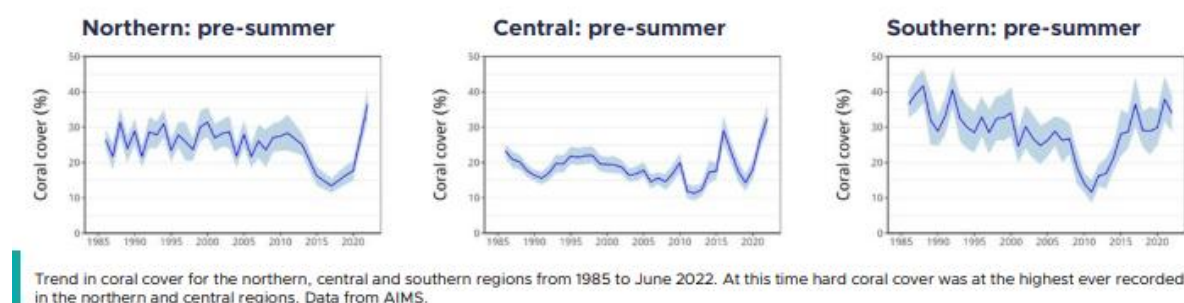
The SLATS report from 2020-21 confirmed 82 per cent of clearing (288,165 ha) across Queensland is sparse regrowth across Category X land, which is not regulated clearing under the *Vegetation Management Act 1999*

<https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/slats/slats-reports/2020-21-slats-report>. Category X land is not remnant forests as purported by conservationist statements. It is regrowth and woody weeds where tree-grass balance needs to be actively managed. Ground cover, not tree cover determines erosion risk.

Woody vegetation clearing only occurred across 164,766ha of Reef catchments in 2020-21, **which is less than 0.4 per cent of the total Reef catchment area of 38million ha**. Clearing was mainly for pasture, tracks, fence lines and fire breaks which are all required for good land management. SLATS satellite data cannot distinguish between clearing native woody vegetation and invasive woody weeds such as rubber vine, lantana, chinee apple, bellyache bush and Siam weed occurring amongst native woody vegetation.

The SLATS data confirms land clearing rates are at an all-time low and current regulations are sufficient. The Reef should not be used as an emotional trigger to strengthen clearing laws. Land managers rely on federal and state governments to base their policies on true facts behind Reef health and land clearing and not be swayed by unsubstantiated claims by activists using Reef to achieve other business agendas. The government pledge to UNESCO to "impose further restrictions on land clearing" in Reef catchments should be withdrawn. Less than 0.4 per cent of 38million ha cannot be considered a statistically significant clearing rate and cannot validate why government wants to strengthen land clearing regulations.

Figure 1: Record high hard coral cover across vast areas of the Great Barrier Reef. Great Barrier Reef Marine Park Authority – Reef Snapshot 2022-2023 <https://www2.gbrmpa.gov.au/our-work/reef-snapshot>¹



Existing legislative instruments such as Queensland's *Land Act 1994*, *Vegetation Management Act 1999*, *Water Act 2000* and *Soil Conservation Act 1986* protect land condition, conserve soil and prevent environmental degradation across Reef catchments, water courses and the entire state of Queensland (Table 1). There are 26 pieces of existing legislation and regulations for environmental management and planning which are used across agricultural land in Queensland. Queensland Government needs to utilise existing legislation before strengthening more Reef regulations. The minimum practice Agricultural ERA standards are inconsistent with components of these existing legislation instruments (e.g. restrictions when rehabilitating scalded grazing land condition and with mechanical environmental works code practices in the Accepted Development Vegetation Clearing Code for managing necessary environmental works, Qld Govt 2024

<https://www.qld.gov.au/environment/land/management/vegetation/clearing-guides/environmental-works>).

According to the 2022 Reef Scientific Consensus Statement SCS, there is no evidence that increased regulation and agricultural ERA standards imposed by the *Environmental Protection (Great Barrier Reef Protection Measures) and Other Legislation Amendment Act 2019* have improved Reef water quality.

Table 1: Purpose of existing Queensland legislation to protect land condition and water quality.

<i>Land Act 1994</i>	Leaseholders must maintain land in good condition through good land management practices and preventing land degradation and contamination
<i>Vegetation Management Act 1999</i>	Regulation of vegetation clearing to ensure no land degradation and maintain ecological processes on freehold and leasehold land.
<i>Soil Conservation Act 1986</i>	Prepare and approve soil conservation plans, run-off control structures to mitigate soil erosion
<i>Environmental Protection Act 1994</i>	Everyone has a general environmental duty. Regulates intensive agriculture (e.g. feedlots, poultry farms) and high impact earthworks in wetland protection areas.
<i>Sustainable Planning Act 2009</i>	Planning approval for new intensive agriculture and farm diversification to ensure ecological sustainability.
<i>Water Act 2000</i>	Responsible management of works within watercourses, lakes, springs or activities that interfere with overland flow or impact on underground water.

¹ 2022 Reef Scientific Consensus Statement. Question 7.1. What is the mix of programs and instruments used in GBR catchments to drive land management practices for GBR water quality benefits and how effective are they? <https://reefwqconsensus.com.au/question/7-1/>

(3) Remove WQIP targets of minimal consequence such as fertilisers and pesticides.

Phosphorus (P)

Australian soils are phosphorus [P]-limited therefore not a major source of P. 93 per cent of Australian soils have total P concentrations less than 0.03 per cent. Phosphorus limits pasture and legume production in the tropics². The 2022 Reef Scientific Consensus Statement SCS confirms dissolved inorganic phosphorus DIP (from fertiliser sources) is low.

Why does the Grazing Agricultural ERA Standard require records of phosphorus fertiliser use?
Why do Sections 23 and 24 of the Environmental Protection Regulation 2019 prescribe a methodology for phosphorus application in bananas and sugar cane?

(<https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2019-0155#sec.24>).

Chapter 4A of the *Environmental Protection Act EPA 1994* for Great Barrier Reef protection measures only itemises Dissolved Inorganic Nitrogen and Suspended Sediment as “contaminants”, not phosphorus (Section 77 <https://www.legislation.qld.gov.au/view/html/inforce/current/act-1994-062#sec.77>). There is no evidence-based reason why phosphorus should remain a target in the WQIP.

Nitrogen (N)

It is not fair for Reef Policy and Regulations to restrict fertiliser use, impose mandatory, complex record-keeping and portray farming use of fertiliser as a detrimental Reef “contaminant”. PRA recommends the WQIP review to reconsider and reset any target for nitrogen to be evidence-based, realistic and align with new Reef science.

The 2022 Reef Scientific Consensus Statement³ confirms:-

1. Increased levels of nutrients have no negative impact on seagrass ecosystems, GBR wetlands and freshwater streams. Limited evidence of any impact on reef-building crustose coralline algae.
2. Crown of Thorns starfish outbreaks occur due to combined multiple factors including excess nutrient, marine upwellings, high fecundity of COTS and predator removal. COTS outbreak initiation area is midshelf reefs between Cairns and Lizard Islands.
3. COTS larvae survive in high and low nutrient water.
4. No evidence of Reef Protection regulations effectively improving Reef water quality.
5. Nitrogen is a limiting nutrient in marine water. Nitrogen concentration is high in estuaries and inshore waters and is low in midshelf and offshore waters.
6. Midshelf and offshore variations in nutrient availability are not due to fertiliser runoff from farms. Variations are due to natural processes such as upwelling of deep ocean water and a marine organism *Trichodesmium* fixing atmospheric nitrogen.

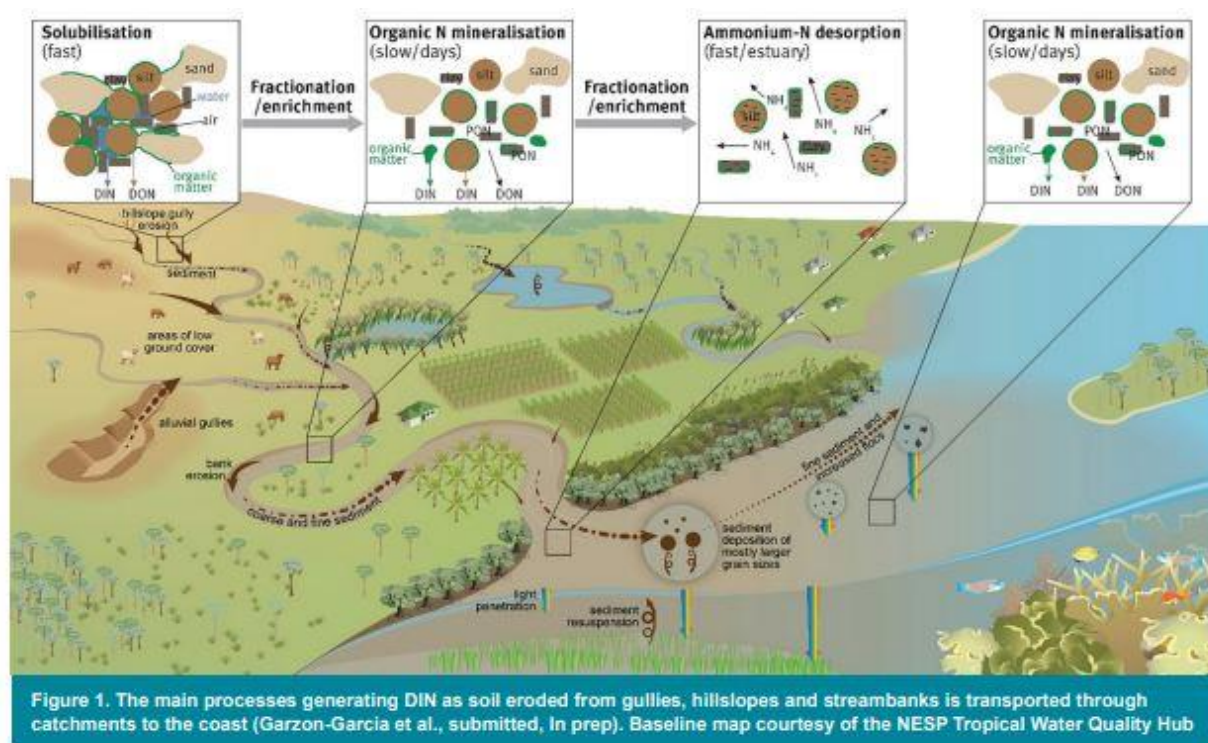
There are multiple sources of Dissolved Inorganic Nitrogen DIN in watercourses draining to the Reef. To date, no research has attributed what portion of DIN comes from fertiliser runoff. The main source

² Jones, RJ. 1990. Phosphorus and beef production in northern Australia. 1. Phosphorus and pasture productivity – a review. *Tropical Grasslands* Vol 24. pp. 131-139.
https://www.tropicalgrasslands.info/public/journals/4/Historic/Tropical%20Grasslands%20Journal%20archive/PDFs/Vol_24_1990/Vol_24_03_90_pp131_139.pdf

³ 2022 Reef Scientific Consensus Statement Summary. 2024. Pages 46, 47, 52, 53, 56-59.
<https://reefwqconsensus.com.au/summary/>

of N to the Reef is from internal, biological recycling and not from fertiliser use in coastal catchments with high rainfall⁴. Particulate nutrients associated with fine suspended sediment in flood plumes can be transformed into bioavailable DIN by the natural processes of desorption or remineralisation by bacteria, fungi and phytoplankton (Figure 2). These natural pathways of microbial processing of particulate N from leaf litter, organic matter, cane trash, mangroves and saltmarshes, etc can contribute 25 to 100 per cent of DIN load in river plumes⁵. To be credible and realistic, the WQIP needs to provide evidence of fertiliser runoff apportionment to total available DIN and to state that any “perceived” impact may be a short, flood plume pulse along inner shore reefs.

Figure 2. Multiple sources of Dissolved Inorganic Nitrogen DIN, including attached to fine sediment and natural processes breaking down particulate, organic nitrogen into soluble DIN. (Garzon-Garcia and Lewis, NESP Project 5.8 Outcomes Factsheet <https://nesptropical.edu.au/wp-content/uploads/2021/05/NESP-TWQ-Project-5.8-Outcomes-Factsheet.pdf>)



Pesticides

Pesticide detection at extremely low concentrations and below water quality trigger values has no effect on aquatic organisms in waterways, nor the Great Barrier Reef Lagoon. Corals are not exposed to pesticides. They are further away from where pesticides are detected.

⁴ Garzon-Garcia A, Burton JM, Lewis S, Bainbridge Z, DeHayr R, Moody P, Brodie J. 2021. The bioavailability of nitrogen associated with sediment in riverine plumes of the Great Barrier Reef. *Marine Pollution Bulletin*. 173 <https://doi.org/10.1016/j.marpolbul.2021.112910>

⁵ Lewis, S., Bainbridge, Z., Stevens, T., Garzon-Garcia, A., Chen, C., Bahadori, M., Burton, J., Rezaei Rashti, M., James, C., Smithers, S., & Olley, J. (2020). What’s really damaging the Reef? Tracing the origin and fate of the environmentally detrimental sediment and associated bioavailable nutrients. Report to the National Environmental Science Programme. Reef and Rainforest Research Centre Ltd, Cairns. <https://nesptropical.edu.au/index.php/round-5-projects/project-5-8/> and <https://nesptropical.edu.au/wp-content/uploads/2021/05/NESP-TWQ-Project-5.8-Final-Report.pdf>.

Annual marine monitoring for pesticides using passive and grab samples confirmed no detected pesticides exceeded the current marine water quality trigger values⁶. Queensland Government Reef Protection regulations from 2009 prescribe five residual herbicides which have additional usage and competency training requirements (atrazine, ametryn, diuron, hexazinone and tebuthiuron). Detection levels of these five herbicides are below water quality trigger values which ensure 99 per cent of aquatic organisms are safe. The minuscule pesticide levels detected are measured in micrograms. There are one million micrograms in one gram ($10^{-6}\mu\text{g}=1\text{g}$) and hence there is no biological impact of pesticides at these extremely low detected levels.

Queensland Government's Pesticide Reporting Portal and interactive map⁷ <https://storymaps.arcgis.com/stories/c0f0c6d7d88a4fd3a5541fe59f41ff75> provides real-time pesticide monitoring across Reef Catchments. Detected levels rarely exceed water quality trigger values, therefore there is no evidence that pesticides impact on Reef, marine organisms and coral health. The WQIP should remove pesticides as a water quality target and withdraw the unnecessary pesticide usage and record-keeping regulations imposed on commercial Reef producers.

The methodology for assessing pesticide risk and runoff for annual Reef Report Cards has changed three times since the first baseline Reef report card in 2009. The method changed from estimating pesticide loads to concentrations to cumulative toxicity of pesticide mixtures.

There are many concerns with the latest methodology using Species Sensitivity Distributions SSD and cumulative toxicity of pesticide mixtures:-

- The cumulative pesticide mixture theory is based on assumptions and modelled outcomes, with limited monitoring evidence.
- The additive impact of pesticide mixtures is questioned. There is no evidence this occurs in the water column and would require the extremely small amounts of pesticide runoff to be in the same waterway location at the same time, if the pesticide molecules could bind and interact.
- No consideration of biological degradation of pesticides in the water column over time, nor use of the stream flow variable.
- No consideration of existing pesticide runoff risk methodologies and models used by the national pesticide regulator, the Australian Pesticide and Veterinary Medicines Authority APVMA, which are recognised internationally.
- Average daily pesticide runoff concentrations estimated from 53 monitoring days are extrapolated out to 182 days. A bias could occur, depending if monitoring days coincided with rainfall events or not.

(4) Include targets for renewable energy land use across Reef Catchments

The installation of renewable energy production sites, energy storage batteries and high voltage transmission lines are anthropogenic uses of land. Scenario modelling by the Institute of Public Affairs shows up to 119,000ha or 33 per cent of Australia's agricultural land use will be required for

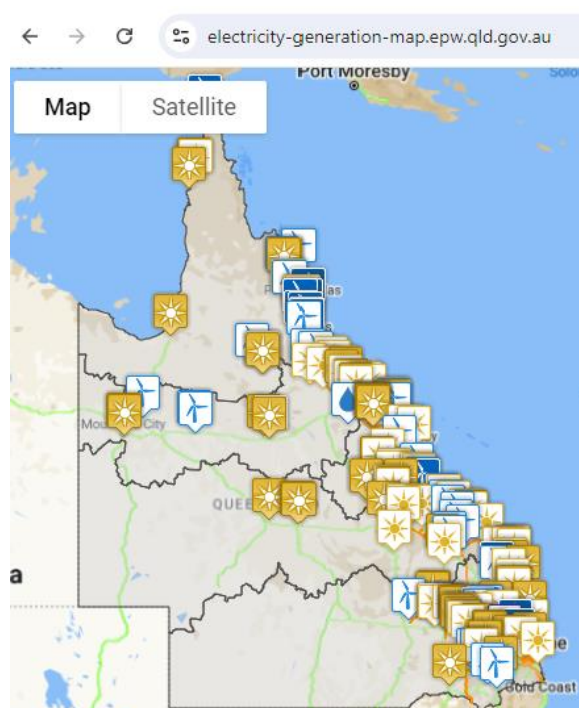
⁶ Thai, P., Paxman, C., Prasad, P., Elisei, G., Reeks, T., Eaglesham, G., Yeh, R., Tracey, D., Grant, S. and Mueller, J. 2020, Marine Monitoring Program: Annual Report for inshore pesticide monitoring 2018–19. Report to the Great Barrier Reef Marine Park Authority, Townsville, 69 pp.
<https://elibrary.gbrmpa.gov.au/jspui/handle/11017/3666>

⁷ Water Quality & Investigations, 2020, *Catchment Loads Monitoring Program Pesticide Reporting Portal*, Department of Environment and Science, Brisbane, Australia.
<https://storymaps.arcgis.com/stories/c0f0c6d7d88a4fd3a5541fe59f41ff75>

solar and wind powered electricity⁸. Other nationwide anthropogenic activities include new electricity transmission lines (28,000km) and green hydrogen pipelines (14, 800km).

More than 100 existing or proposed renewable energy generation sites are within Reef catchments (Figure 2). The revised WQIP must include renewable energy land use in the Queensland Land Use Mapping Program [QLUMP] data used for sediment and nutrient run off modelling. Data from 100 renewable energy sites, including the latitude and longitude of existing and proposed electricity sites and battery storages across Reef catchments can be downloaded, as an Excel spreadsheet, from Queensland Government's electricity generation map website <https://electricity-generation-map.epw.qld.gov.au/>. The WQIP and annual report cards are based on outdated 2021 land use data from QLUMP⁹, which excludes disturbed and cleared areas for renewable energy sites. PRA recommends the QLUMP land use data codes for utilities (5.6.0 to 5.6.7) needs to be segregated out of the current combined data code 5.0.0 which includes manufacturing, industrial, services, communication, waste treatment and utilities. Incorrect use of data codes, in Paddock to Reef models, unfairly blames anthropogenic runoff from agricultural land use, whereas coexisting electricity generation development sites are potentially the main cause of soil disturbance and woody vegetation clearing.

Figure 2: Existing and proposed electricity generation land use areas for Queensland, showing the conglomeration of 100 sites within Reef catchments. Details of project sites, including geographical coordinates can be downloaded from the Queensland Government website - <https://electricity-generation-map.epw.qld.gov.au/>. The WQIP review must consider impacts from renewable energy infrastructure and transmission lines and include this land use within QLUMP and Reef modelling data.



⁸ You, K and Begg, M. 2023. Analysis of land use by variable renewable energy production by 2050. Institute of Public Affairs. <https://ipa.org.au/wp-content/uploads/2023/12/IPA-Research-Analysis-of-Renewables-Land-Use-by-2050-FINAL.pdf>

⁹ Queensland Government Open Data Portal. 2023. Land use mapping-2021- Great Barrier Reef NRM regions. Version 1. <https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/qlump/qlump-datasets>

Figure 3: Wind and solar factory development sites are exempt of Vegetation Management and Reef Protection regulations. Vast tracts of cleared land for renewable energy projects across Reef catchments are subject to erosion risk and runoff of sediment. The WQIP excludes these “service utility” development areas as risks to Reef water quality and only considers “agricultural land use”. Photo Source: Steven Nowakowski. Clarke Creek/Connor Range.

<https://www.youtube.com/watch?v=KpPJUPbHEo>



FUTURE COLLABORATION

Thriving coastal communities balancing productivity, profitability and environmental outcomes.

Design activities to benefit Reef health AND agricultural productivity.

Build farmer trust, participation and partnerships by establishing a network of real-time, monitoring points on and off farms across priority sub-catchments, similar to the previous Australian Government NESP-TWQ Project 25¹⁰ in the Russell/Mulgrave catchments. This project brought farmers, researchers and water quality monitoring equipment together across a sub-catchment. The outcome was real-time monitoring data (CSIRO's 1622TM ¹¹) direct to farmers so they had direct feedback about their practices. This led to identifying hotspots, continuous improvement of practices and enhanced Reef science. The project achieved two-way communication between Reef and catchments. Scientists learning from farmers and vice-versa.

Foster a support network of agronomic extension services across the private and public sector which focus on economic, environmental and productive sustainability for agricultural enterprises. Engage with practical and experienced agronomists and soil conservation officers who understand agricultural practices, have credibility in the agricultural sector and can readily relate to producers.

Producers will adopt land management practices which are practical, affordable and productive. If it is worth doing, they will do it themselves. The WQIP needs to focus on maintaining land in good

¹⁰ Australian Government – National Environmental Science Program – Tropical Water Quality Hub (NESP-TWQ Hub) -Project 25 <https://nesptropical.edu.au/index.php/round-4-projects/project-4-8/> and <https://eatlas.org.au/nesp-twq-4/on-farm-decision-making-4-8>

¹¹ CSIRO 1622TM real-time water quality monitoring <https://wq.1622.farm/>

condition, rather than restoring degraded land. Rehabilitation of “D condition” degraded land generally requires mechanical intervention, which costs from \$150/ha to \$260/ha. None of the mechanical rehabilitation treatments (deep ripping, chisel ploughing or crocodile seeding) returned a positive Net Present Value NPV, compared to doing nothing at the Spyglass Station trial site in the Burdekin catchment¹². Voluntary adoption levels for costly, uneconomic major and/or extensive land restoration projects will be low. PRA does not believe that legislation or regulation should be used to force uneconomic projects. Without voluntary adoption, Queensland Government’s biodiversity target of restoring 2million hectares of priority degraded ecosystems by 2030 may not be achievable. The Reef WQIP should remain separate to the biodiversity target, to avoid reporting future failures to entities such as UNESCO’s World Heritage Committee.

For water quality outcomes, the definition of “land rehabilitation and restoration” needs to encompass more activities than what is outlined in Queensland’s Biodiversity Conservation Strategy¹³ and Land Restoration Fund [LRF]. The Strategy and LRF defines land restoration activities as “reforestation, replanting, wetland recovery” and “carbon sequestration”. Long term stability of soils, hydrology and minimising sediment runoff to the Reef can be achieved through “land repair” rather than “restoration”. Activities need to be technically sound, economically viable, socially and culturally acceptable and politically feasible. The aspirational target of land restoration attempts to return vegetation to the original ecosystem. Land “repair” to maximise ground cover, rather than “restoring” woody native vegetation across modified agricultural landscapes is the best option for water quality outcomes.

Focus on gully prevention rather than gully rehabilitation

The Reef SCS states land management and remediation are most cost-effective when targeted at hotspots of fine sediment and particulate nutrient runoff. Land restoration needs to be cost effective and achieve measurable outcomes to benefit Reef health. It is not cost-effective or feasible to restore large hillslope gullies across Reef catchments. The WQIP needs to stop focusing on gullies and using tax payer’s money (packaged up as “government grants”) to fix major gullies.

The WQIP must do the economics and consider feasibility. Based on results from the gully erosion project area in the Bowen, Broken, Bogie BBB sub-catchment in the Burdekin, an additional 129 gullies would need to be rehabilitated to achieve the water quality target for the BBB catchment. Rehabilitation costs per gully ranged from \$3K to \$1million. Monitoring confirmed only two of the

¹² Movarek T and Hall T.J. 2015. Economic impacts of rehabilitating degraded lands in the Burdekin catchment. Proceedings of the Australasian Rangeland Society Biennial Conference, Alice Springs.
https://austrangesoc.com.au/wp-content/uploads/2021/01/ARS_2015_3P.-Moravek-and-Hall.pdf

¹³ Queensland Government, 2022. Biodiversity Conservation Strategy for Queensland.
https://www.qld.gov.au/data/assets/pdf_file/0015/222081/queensland-biodiversity-conservation-strategy.pdf . Pages 19, 22.

seven trial sites, at Strathbogrie and Mt Wickham Stations, reduced sediment and nutrient load concentrations¹⁴. The two sites costed \$44K to protect 41ha and \$595K to protect 14ha¹⁵.

Proximity to the GBR Lagoon for Reef water quality outcomes

The WQIP needs to utilise the extensive, scientific knowledge of catchment runoff and GIS mapping of dispersive soils and runoff hotspots to prioritise localised projects to achieve improved Reef health. Focus on potential sources of fine sediments, less than 16 microns, which are below dam structures and close to the coastline watercourses.

Agricultural land upstream to dams is only connected to the GBR Lagoon during extreme rainfall events and therefore of limited benefit to Reef water quality. Dam structures such as the Burdekin Dam trap 50 to 85 per cent of coarse sediment^{16 17}.

Other dams such as Faust Dam¹⁸ near Proserpine, Boondooma Dam and Paradise Dam in the Burnett trap all runoff from upstream agricultural land, except during exceptional wet years, with negligible discharge of suspended sediment.

Sediment tracing studies from Lewis *et al* (2015)¹⁹ confirms coarse sediment particles (>16microns) and 80 per cent of particulate nutrients are deposited within 10km of the river mouth. Only a portion of fine suspended sediment (<16 microns) forms turbid flocs which may impact on the inner shore Reefs and sea grass beds within 60km of the coastline. When freshwater mixes with salty ocean water, suspended sediment clay particles flocculate out and sink, when salinity is above 10 practical salinity units – 10 PSU²⁰.

¹⁴ Bartley, R., Hawdon, A., Henderson, A., Abbott, B., Wilkinson, S., Goodwin, N. and Ahwang, K. (2020) Quantifying the effectiveness of gully rehabilitation on water quality: results from demonstration sites in the Burdekin catchment. Report to the National Environmental Science Program. Reef and Rainforest Research Centre Limited, Cairns (146pp.). <https://nesptropical.edu.au/wp-content/uploads/2021/01/NESP-TWQ-Project-5.9-Final-Report.pdf>

¹⁵ Bartley, R., Wilkinson, S., Henderson, A. Hawdon, A. (2018) Cost effectiveness of gully remediation in the Burdekin catchment: preliminary insights based on measured data from NESP monitoring sites and progress with new Lidar methodologies. Report to the National Environmental Science Program. Reef and Rainforest Research Centre Limited, Cairns (28pp.). <https://nesptropical.edu.au/wp-content/uploads/2019/01/NESP-TWQ-2.1.4-TECHNICAL-REPORT-3.pdf>

¹⁶ Cooper, M., Lewis, S.E., Smithers, S.G., 2016. Spatial and temporal dynamics of suspended sediment causing persistent turbidity in a large reservoir: Lake Dalrymple, Queensland, Australia. Marine and Freshwater Research, 68(7) <https://www.publish.csiro.au/mf/mf16316>

¹⁷ Lewis, S.E., Bainbridge, Z.T., Kuhnert, P.M., Sherman, B.S., Henderson, B., Dougall, C., Cooper, M., Brodie, J.E., 2013. Calculating sediment trapping efficiencies for reservoirs in tropical settings: A case study from the Burdekin Falls Dam, NE Australia. Water Resources Research, 49, 1017-1029 <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/wrcr.20117>

¹⁸ Department of Energy and Water Supply, 2016. Whitsunday regional water supply security assessment. Page 8 – Historical performance of Peter Faust Dam. https://www.dnrme.qld.gov.au/data/assets/pdf_file/0004/393961/whitsunday-rwssa.pdf

¹⁹ Lewis S, Bartley R, Bainbridge Z, Wilkinson S, Burton J, Bui E. 2015. Burdekin sediment story. Report no 15/50 for NQ Dry Tropics NRM. <https://research.jcu.edu.au/tropwater/publications/1550BurdekinSedimentStory.pdf>

²⁰ 2022 Reef Scientific Consensus Statement. Question 3.1 evidence. Spatial and temporal distributions of terrigenous sediments within GBR. <https://reefwqconsensus.com.au/question/3-1/>

Coastal ecosystems such as mangroves and salt marshes are dependent on trapping, processing and storing sediment and organic matter²¹. Droughts and floods, due to climate variability, can cause mangrove dieback. These natural disturbances cannot be attributed to agricultural practices.

Further information

PRA commends the Office of Great Barrier Reef for inviting feedback from community and providing a series of webinars outlining the content of the Reef WQIP review. The consultation process was constructive.

Reef policy is very complex. There is an enormous amount of evidence-based, scientific facts which can be used to continuously improve policy and effective management of the Great Barrier Reef. Alongside Reef Policy and equally important are policies to ensure adjoining Reef catchments are sustainable for thriving, viable rural and coastal communities. PRA is relying on Queensland Government, Australian Government and the Office of Great Barrier Reef to get the policy balance right and make independent, informed decisions.

Please contact Property Rights Australia, if you require clarification or further information on any of the points raised in this submission.

Key PRA contacts for Reef policy are: -

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Director: Marie Vitelli

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²¹ Goudkamp, K. and Chin, A. 2006, 'Environmental Status - Mangroves and Saltmarshes' in Chin, A, (ed) The State of the Great Barrier Reef, Great Barrier Reef Marine Park Authority, Townsville.
<https://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/666/1/State-of-the-Reef-Report-2006-Mangroves-and-saltmarshes.pdf>