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Identification of leading practices in ensuring evidence-based regulation of farm practices that impact water quality outcomes in the Great Barrier Reef.

Supplementary Submission: Innisfail District Cane Growers Organisation Limited TA CANEGROWERS Innisfail.

Q1: Senator Green asked for a further submission regarding the content of our original submission regarding our assertions that the science papers that the Independent Science Panel relied on, were flawed.

Senator Green said*: "I just want to turn to the submission that the Innisfail District Cane Growers Organisation made. Some of the comments in that submission are similar to things that you've said and that other witnesses have said throughout the evidence. I'm happy if anyone wants to answer this. In this submission, you say that, when you fully consider the science reports used by the group of scientists to create the consensus statement, there are flaws in some of these reports. What is that comment based on?" (Draft - Proof Committee Hansard SENATE RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE Regulation of farm practices that impact water quality outcomes in the Great Barrier Reef (Public) TUESDAY, 28 JULY 2020 BRISBANE.)*

Our submission said:
"The Queensland Government in its approach to introduction of additional regulations that imposes additional burden of farmers, has used the "Scientific Consensus Statement'" to support the imposed regulations. However, when you fully consider the "science" reports used by the group of scientists to create the consensus statement, there are flaws in some of these reports.

Science reports are not subject to the degree of peer review that would then provide credible support of the science behind those outcomes that some reports deliver, especially the reports that rely on hypothetical explanations from limited observations and modelling that use assumptions supporting modelled outcomes.

After reviewing the 2017 Scientific Consensus Statement, the following statement is included.

"The 2017 Scientific Consensus Statement is currently the best and most authoritative source of information to support evidence-based decisions for better water quality within the Great Barrier Reef World Heritage Area. The panel supports the general findings, conclusions and recommendations of the updated statement."

However, we question two specific aspects of the 2017 Scientific Consensus Statement, to provide as examples, why the "science" is unclear or bias because of the assumptions made, either by panel members or within the "science" papers relied on by the panel, suggesting the data relied on is flawed..

The 2017 Scientific Consensus Statement, the following statements are included:

- *"The effects of nutrient run-off include increased outbreaks of coral-eating crown-of-thorn starfish, lower coral diversity, algal blooms, increased susceptibility to coral bleaching and some coral diseases."*

- *"Dissolved inorganic nitrogen is of greatest concern because it is immediately and completely available for uptake by marine plants and algae. The main source of dissolved inorganic nitrogen is fertiliser run-off from cane farms."*

In regard to crown-of-thorn starfish (COTS) we refer to the science paper: Wolfe, K., et al., Superstars: Assessing nutrient thresholds for enhanced larval success of Acanthaster planci, a review of the evidence, Marine Pollution Bulletin (2017), http://dx.doi.org/10.1016/j.marpolbul.2016.12.079

"Through generation of empirical data in tightly controlled nutrient conditions, this study addressed the hypothesis that there is a threshold of chl-a/algal food that promotes the disproportionate success of COTS larvae, with carryover effects to the juvenile. Our study encompassed the critical nutrient thresholds modelled from previous data (Table 1) and included the ranges of environmental oligotrophic and eutrophic conditions typical of coral reefs, from 0.1 to 5.0 μg chl-a L−1. We observed high success of the larvae to the settled juvenile across an order of magnitude range of concentrations (0.5–5.0 μg chl-a L−1).

Thus, it appears that there may not be a narrow trigger value for optimal success, counter to that proposed in previous studies (Table 1). ***Success to the juvenile stage was observed in the low nutrient range. Importantly, we emphasise that a dichotomy between the enhanced nutrients and larval resilience hypotheses is not appropriate.*** *These hypotheses are complimentary and are linked through the larval biology of COTS.*

Since the larvae of COTS have been shown to exhibit developmental plasticity in their feeding structures (ciliated bands) (Wolfe et al., 2015b), we suggest that high larval survival occurs across a broad range of nutrient levels, and most importantly, below the levels posited asteroids with planktotrophic development (Wolfe et al., 2015b; Caballes et al., 2016). Food limitation may not be as important a factor for the success of COTS than the enhanced nutrients hypothesis posits (Olson and Olson, 1989)

Overall, it appears that no single hypothesis solely explains the boom-and-bust population characteristics of COTS *(Pratchett et al., 2014; Westcott et al., 2016)."*

There is also no consideration of whether starfish plagues are entirely natural, thus ignoring the evidence by of Walbran and Henderson (1989) and Pratchett et al., (2018).

Even to an ordinary person, without any formal study of COTS, it is clear that there is **no link** between enhanced nutrients and the increase and outbreaks of COTS on the Great Barrier Reef. Yet in the 2017 Scientific Consensus Statement states that there is. Either the Impendent Panel has ignored the "science" paper or mis-understood the findings in that paper. It creates a falsehood.

Our Submission said:
"An example are the statements that high nutrient loads are a major contribution to outbreaks of crown-of-thorns Starfish outbreaks. In the Executive Summary of the Scientific Consensus Statement, "The condition of mid-shelf and outer shelf coral reefs in the Cairns/Cooktown Management Area also continues to be affected by a population outbreak of crown-of-thorns starfish, arguably the most important indirect effect of excess nutrients on Great Barrier Reef coral reefs, and ***"The link between high nutrient availability, such as observed after significant flood events, and primary outbreaks has been further strengthened".***

Regarding Dissolved Inorganic Nitrogen, (DIN) our submission said:
"Most of the science/research papers use "modelling" to identify levels of DIN and what farming practices should be used that would reduce DIN levels. Due to the absence of actual monitoring of water run-off the land, both surface and subsurface, it is questionable if the modelled effect of any particular farming practice would replicate actual outcomes, rather than implied as is the case in research "science" reports. The modelling used relies on assumptions, not verified 'ground-truthed' data.

However, as witnessed, the science/researcher papers that have been used by the Queensland government to determine what regulations should be imposed, lack robust evidence that can distinctly identify the actual level of DIN runoff into waterways from sugarcane farming.

With the staunch position taken by the Queensland government to use the Scientific Consensus Statement to support the action taken to impose regulation on the growing of sugarcane, the science supporting that 'statement' must be unquestioning. ***However, supporting 'science' lacks rigour and actual verified data, rather than modelled data."***

Associated with levels of DIN levels recorded on the Great Barrier Reef is the impact of up-welling of nutrient rich water.

Our Submission said:
"Another example of the mis-match of science used in support of the imposed regulations is the failure of all science reports to not include the impact of up-welling of nutrient rich water from the deep waters off the outer face of the Great Barrier Reef, even within the Great Barrier Reef around islands and the mainland coast, upwelling as a result of turbulent mixing and internal waves bring up nutrient rich water from deeper levels. Walter Starck 'Threats' to the Great Barrier Reef. IPA Backgrounder May, 2005, Vol 17/1

The following was not included in our original submission, we now include as references in response to the query from Senator Green. Some general issues that can be found in either the 2017 Science Consensus Statement, or the 2019 GBR Outlook report which ignores contradictory evidence.

Sediment: The sections on the effect of agricultural sediment on the GBR largely ignore the very large body of geological evidence that demonstrates that many of the Inshore Reefs have always been highly turbid environments. The dominant influence of strong winds causing waves that stir up the sediment on the seabed is also largely ignored as is the relatively small influence of river plumes. In one case a paper, that has been completely discredited, is used in the 2019 GBR outlook report (reference 745) to supposedly show the damaging effect of sediment on coral.

Pesticides: The fact that, for the Inshore Reefs, pesticides are generally in extremely low concentrations or are undetectable is not reported. The fact that for the GBR reefs measurements are almost never attempted because concentrations are too low to detect is also not reported.

Cyclones: The fundamental role of cyclones on the ecosystem is ignored (see Dr Piers Larcombe's submission on this point). Cyclones entirely dominate the GBR ecosystems. As Dr Piers Larcombe points out, they "reset" the seabed due to the action of waves destroying coral and massively stirring up the seabed. The amount of sediment moved by cyclones is roughly 100 times greater than comes down the rivers and yet this effect is totally ignored. Vast areas of the seabed are churned up to a few tens of centimetres depth, and huge sand dunes smother sea-bed communities.

The 2017 Scientific Consensus Statement failures to give an indication of the potential scale of the problem from agriculture.

- No indication is given of the amount of coral on the Inshore reefs that is influenced by agriculture. Recent papers and comments by AIMS indicate that only 1-3% of the coral is influenced by agricultural activity.

- The importance of the inshore systems to the GBR is exaggerated. There is no evidence to indicate that even if the Inshore Reefs have been degraded, there would be any significant effect on the offshore GBR reefs, as is often claimed. It should be noted that for much of the geological history of the GBR when the sea level was lower, the Inshore Reefs did not exist and the GBR was fine.

- No indication is given of the amount of coral killed by sediment or pesticides.

We are not qualified to be the judge of science papers. The Committee should rely on questions of the science from this who experience and understanding of the Great Barrier Reef, not only marine scientists but others , such as Dr Peter Ridd. His submission should be read and understood by the committee as it does demonstrate the conflicting science used by the Queensland Government to impose regulations on agricultural industries.

Senator Green also asked, generally of the witnesses, if the "independence" of the Independent Science Panel was being put queried. There has been no reference to the question of independence of the panel in our submission. So, in response to the statement made by the Senator, we take this opportunity to include comments.
The Independent Science Panel members are: Roger Shaw, Eva Abal, Mike Grundy, Peter Doherty, Hugh Yorkston, Graham Bonnett, Andrew Ash (CSIRO), Jenny Stauber (holds a government position) and Bronwyn Harch

Lead authors: Jane Waterhouse, Britta Schaffelke, Rebecca Bartley, Rachel Eberhard, Jon Brodie, Megan Star, Peter Thorburn, John Rolfe, Mike Ronan, Bruce Taylor, and Frederieke Kroon.

Membership:
The Independent Science Panel has a skills-based membership that may include up to nine members, including an independent chair, with expertise in the following areas:

- agronomic and landscape processes
- marine and freshwater biochemistry, ecology, and modelling
- resource management, water quality and ecosystem health target-setting and monitoring
- information integration, synthesis, reporting and communication
- social and economic methodologies
- statistics and analytics coastal ecosystems ecotoxicology.

Independent Science Panel remarks from the 2017 Scientific Consensus Statement, provide overview of the role of the panel:
"The Independent Science Panel provides strong independent science-based and technical advice to the Australian and Queensland governments on water quality science needs. It is a working group of the Reef 2050 Independent Expert Panel which provides broader scientific advice on implementing the Reef 2050 Long-Term Sustainability Plan."

- Conducts scientific reviews of Reef 2050 Water Quality Improvement Plan activities and initiatives, including annual and other reports, and makes specific recommendations about the direction, content, and details of future activities.

- Provides advice on knowledge gaps, science priorities and delivery associated with the overall implementation of the Reef 2050 Water Quality Improvement Plan.
- Conducts scientific reviews of Reef 2050 Water Quality Improvement Plan activities and initiatives, including annual and other reports, and makes specific recommendations about the direction, content, and details of future activities.
- Conduct scientific reviews of the Wet Tropics Healthy Waterways Partnership, Dry Tropics Partnership and Mackay Whitsunday Healthy Rivers to Reef Partnership activities and initiatives.
- Provides timely independent scientific advice and review to ensure Reef 2050 Water Quality Improvement Plan implementation, monitoring and reporting:
- is scientifically defensible and achievable
- is being undertaken in a scientifically credible and cost-effective manner
- has been designed, implemented, and managed according to best scientific and environmental standards
- will utilise contemporary, fit-for-purpose methods of data collection, quality assurance and statistical methodologies
- has processes in place to effectively integrate the various program activities (and where appropriate other related activities)
- will communicate the findings in a timely and appropriate manner to both technical and non-technical audiences.
- Provides advice on the possible inclusion of new and innovative methods to support monitoring and reporting activities.

The only challenge we have to “independence” is the positions that some members have in government and the support of the “lead authors” and the “independence” of their own works.

The many errors and omissions in the secondary literature point to an inadequate review process.

The peer review process of the 2019 GBR Outlook Report casts a shadow over the “independence status of the panel. Of the four peer-reviewers chosen, two are from James Cook University’s coral reef centre that is responsible for much of the work in the report. They are therefore not independent and are reviewing their own institution’s work.

The other two reviewers cannot be considered “scientists with a deep knowledge of the GBR”. One trained as a political scientist and economist and undertakes research in the field of public policy and governance, with a particular interest in public policy relating to sustainable development. The other has a background in law, particularly relating to indigenous issues.

This demonstrates completely inadequate quality assurance protocols.

Q2: Senator Green asked for clarification regarding the origin of the 30% decrease in nutrient application rates.

Senator GREEN said, *"There were some comments about needing to reduce nitrogen by a further 30 per cent—is that further than the SIX EASY STEPS"*

"I understand that there are some fact sheets as well that the Queensland government has produced. I think there is also an explanation of what is required of sugar cane farmers to achieve that minimum standard. I've had a look through those papers today and I haven't been able to find a reference to either a 30 per cent reduction or transferring from B to C. I'd like to know where that figure is coming from, even if you have to go down the rabbit hole to find it."

The Six Easy Steps program provides a proven methodology for growers to calculate the optimum rate of vital nutrients based on their cane production situation. This methodology is backed by years of research trials and is recognised as industry best practice.

The ABCD framework is a regionally specific, reporting mechanism used to model the water quality impacts of farm, land management practice. In this framework, (D) is considered unacceptable and (A) is cutting edge. This data, reported annually, is what informs the Reef Report Card.

At present, growers who undertake industry best practice are considered C class in the P2R reporting framework. Under this framework, growers transitioning to a B class, would be required to reduce their nitrogen rates by up to 30% based on an unfounded nutrient calculation method called block yield potential.

In 2019 amendments to the Environmental Protection act required the department to legislate farm practices that would achieve a modelled water quality target, more specifically, the adoption of B practice. The Regulatory Impact Statement undertaken at that time wrongly promoted an economic benefit to growers reducing their N rates by 30% with no consideration given to the resultant yield decline.

Through fierce lobbying, industry was barely able to have this proposed regulation modified. Considering the regulations are reviewed every five years, and the lobbying efforts by conservation groups, there remains justified concern that these forced N reductions, based on block yield potential, are inevitable by 2024.

Joseph Marano

Chairman
Innisfail District Cane Growers Organisation Limited