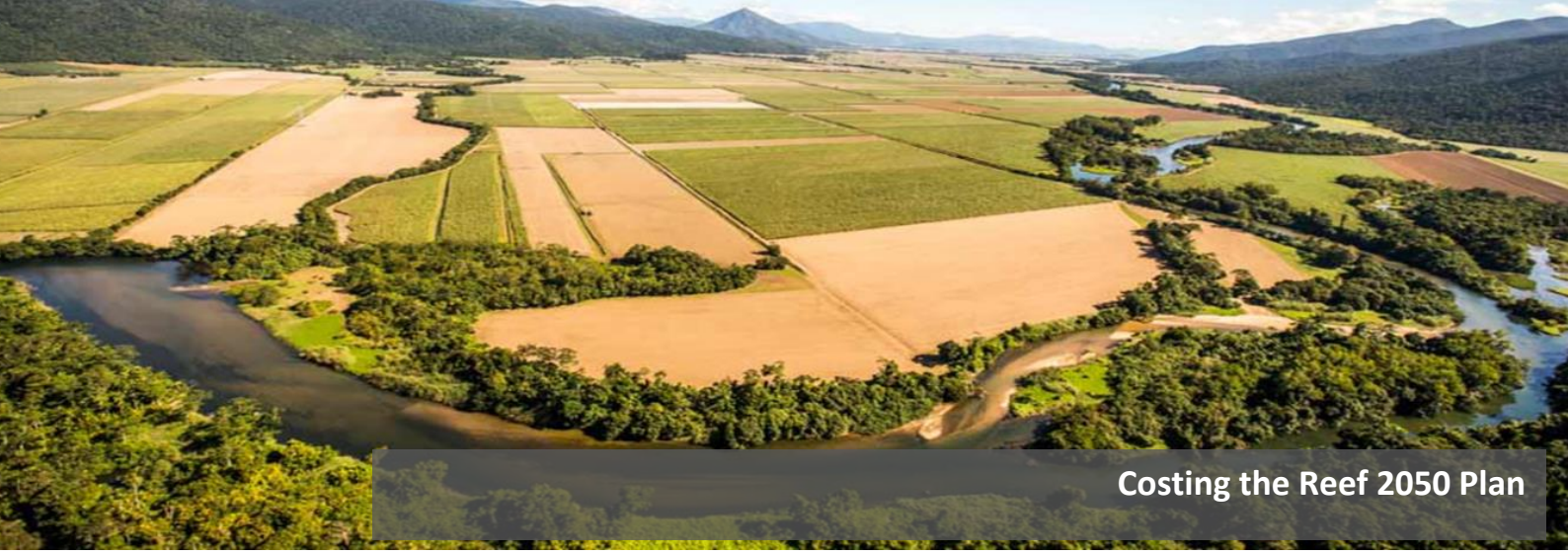


# Costing the Reef 2050 Plan

**The Great Barrier Reef**

The Great Barrier Reef (GBR) is arguably Australia's most iconic natural asset. It is the world's largest coral reef ecosystem, stretching 2300 kilometres. It was declared a World Heritage Area in 1981 and added to the National Heritage List in 2007.

Being a living thing the reef is both precious and fragile and virtually all of the relevant science indicates that the GBR is in decline. What we do on land has a real impact out on the reef: sediments can smother the corals, while high nutrient levels help to trigger more regular and larger outbreaks of crown-of-thorns starfish. This damage leaves the GBR even more vulnerable to climate change, storms, cyclones and other impacts.

A project was conceived by the Queensland Government's Department of Environment and Heritage Protection (DEHP) to inform changes to the long-term management of the GBR and in particular water quality of catchment runoff. A key component of the project was the recognition that we needed to better understand the broad magnitude of investment required and from a selected suite of policy responses, the actions and approaches that are most likely to be cost effective, relevant and achievable.

The importance, complexity and magnitude of this project was immense and required a collaboration between the best water quality experts, catchment planners, modellers, economists and science communicators in Australia.

**Setting targets for assessment**

The purpose of the project was to estimate the range of costs of achieving two key regional water quality targets for the Great Barrier Reef (GBR) catchments as set out in the Reef 2050 Long-Term Sustainability Plan (Reef 2050 Plan) (Commonwealth of Australia 2015).

The targets selected were those needing to be met by 2025 for anthropogenic end-of-catchment fine sediment loads and dissolved inorganic nitrogen (DIN). These are:

- A 20 per cent reduction in anthropogenic end-of-catchment fine sediment loads for Mackay Whitsunday and Burnett Mary with a 50 per cent reduction in the Fitzroy, Burdekin and Wet Tropics catchment by 2025.
- A 50 per cent reduction in anthropogenic end-of-catchment DIN for Mackay Whitsunday and Burnett Mary catchments and an 80 per cent reduction in the Burdekin and Wet Tropics catchments by 2025.

The team was asked to investigate how much could be achieved, and at what price, by actions in the following seven policy solution sets:

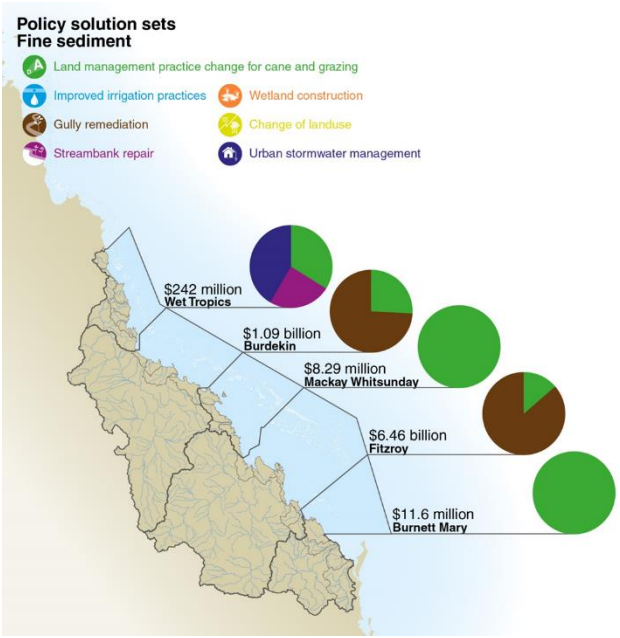
| Policy solution set | Symbol | Policy solution set | Symbol |
|---|---|---|---|
| 1. Land management practice change for cane and grazing | | 5. Wetland construction | |
| 2. Improved irrigation practices | | 6. Changes to land use | |
| 3. Gully remediation | | 7. Urban stormwater management | |
| 4. Streambank repair | | | |

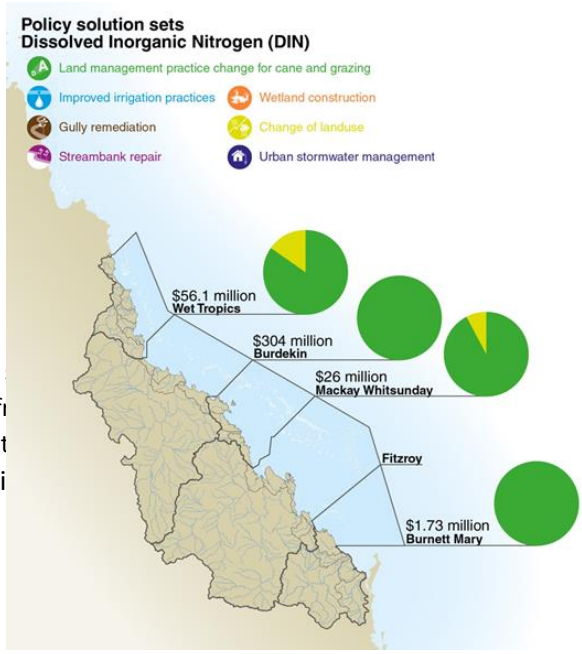
**Understanding costs**

A consistent process was used across GBR catchments to evaluate the cost effectiveness of alternative investments for delivering specific regional water quality targets. The approach used physical modelling to estimate reductions in pollution loads attributable to policy solution sets and economic analysis based on marginal abatement cost curve (MACC) and total abatement cost curve (TACC) approaches. By bringing these two sets of quantitative analyses together we were able to determine a least cost pathway to achieving the regional targets. Given the inherit uncertainties in input data, a range of costs was established for actions within each policy solution set and the total costs of achieving regional targets.

The work provided a strong science based approach, based on the best information available, upon which future impact and cost-effectiveness evaluations can be built.

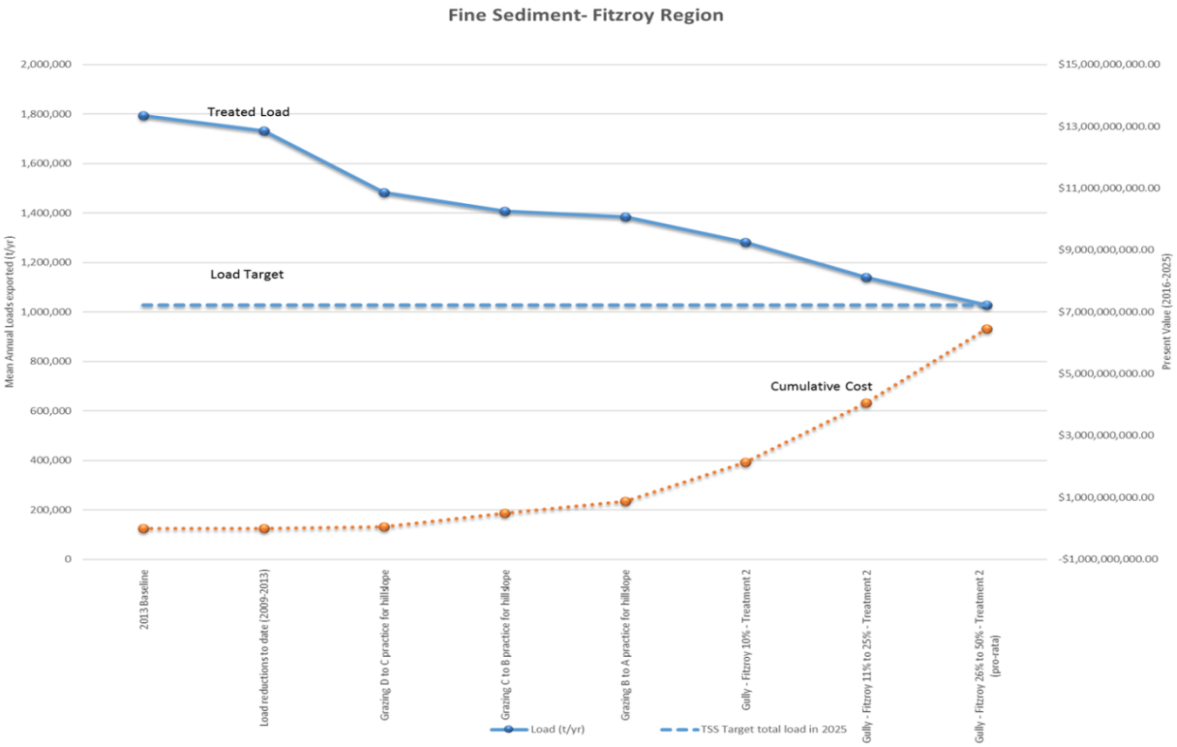
Our analysis indicates the policy solution sets assessed can meet the two water quality targets in most of the GBR catchments. In some areas such as the Wet Tropics (fine sediment and DIN) the relevant policy solution sets and the actions contained within them (as currently defined) cannot be applied widely enough, or they simply cannot address the scale of load reductions required to meet the targets. Meeting targets in this region will require an expansion of the scope of possible policy solution sets and/or actions.



We found significant variance on the marginal abatement costs for the different policy solution sets and their actions. For most regions, significant progress towards targets could be achieved at a relatively low cost.

However, as the abatement targets are approached, policy solution sets with significantly higher marginal costs are often required, and the total cost of achieving the target increases significantly. This reinforces the need to implement low cost investments now and identify how we can enhance the efficiency of other measures as policies and programs are rolled out.




To deliver this project in the timeframes required, the project team built a bespoke model to assess the effectiveness of the different actions with the policy solution sets. The meta-model created by the team could interact with the results from the orthodox Source models, which are highly complex, and also require a high level of resources to construct, run and analyse. The project team also had to modify traditional marginal abatement costing processes to assess the cost of meeting the seven policy solutions sets and their respective actions.

The key tools developed during this project (a meta-model based on the outputs from the Department of Natural Resources and Mines' Reef Source Catchments Models and the abatement curves) will be able to support future policy and investment decision making processes linked to the long-term protection of the GBR. Key project learnings can also inform other GBR planning, prioritisation and investment-related processes.

### There is a big crowd to thank

This project involved a number of individuals who invested a significant amount of unfunded time to deliver this work. The team understood we were charting new territory and providing learnings for all Australians to help make decisions about the future of the GBR. We feel it is highly appropriate to provide a shout out to these people who worked very hard on this project; Steve Skull (Alluvium), Tony Weber (Alluvium), Jim Binney (Mainstream Economics), Jane Waterhouse (C20) Jeremy Cheesman (Marsden Jacob Associates), Megan Starr (CQ University), and Jon Brodie (C20), along with Carole Sweatman from Terrain NRM, and Senior peer reviewers; Barry Hart and Neil Byron who lent their name to the final report forward.

We feel very proud to be able to play a role in protecting the reef for future generations.

*"This work forms an essential part of the thinking needed to protect the Great Barrier Reef into the future and Alluvium and their project partners should be congratulated. The study was ground-breaking in terms of the ability to merge best science, with sound economics and modelling tools.*

*This work brought together academia, government and industry in a collaborative way to advance the science, policy and planning. It was a collaborative success". Geoff Garrett, Former QLD Chief Scientist*