

**Senate Standing Committee on Environment and Communications  
Legislation Committee**

Answers to questions on notice  
**Environment portfolio**

**Question No:**

**Hearing:** North Australia Committee – Aquaculture inquiry

**Outcome:**

**Programme:** Great Barrier Reef Marine Park Authority

**Topic:**

**Hansard Page:** <Hansard Page>

**Question Date:** 26 August 2015

**Question Type:** Verbal

**Senator MACDONALD asked:**

Provide numbers of GBRMPA staff who have scientific credential

**Answer:**

The following numbers of science-related qualifications are held by agency staff from the APS2 – CEO levels:

PHD – 12

Masters – 16

Honours – 23

Bachelor – 53

Other tertiary qualification – 6

These qualifications are held in a variety of specialities including marine science, marine biology, applied science, zoology, environmental science and environmental management.

The Chairman is also a Fellow of the Academy of Technological Sciences.

In addition, staff in specialised areas of the agency including Information Technology, Communications, and Legal Services hold appropriate qualifications. In particular, the Director and all Legal Officers in GBRMPA's Legal Services section are legally qualified; hold degrees from an Australian University and are admitted to practise to the Queensland Supreme Court and High Court of Australia.

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Answers to questions on notice  
**Environment portfolio**

**Question No:**

**Hearing:** Parliamentary Inquiry into Opportunities for Expanding the Aquaculture Industry  
in Northern Australia

**Outcome:**

**Programme:** Great Barrier Reef Marine Park Authority

**Topic:**

**Hansard Page:** <Hansard Page>

**Question Date:** 26 August 2015

**Question Type:** Verbal

**Senator Alannah McTiernan asked:**

1. Provide a response to the CSIRO science, including GBRMPA's view on the findings and whether there is a necessity for up-to-date science.

**Answer:**

The Great Barrier Reef Marine Park Authority does not dispute the science that was conducted by the CSIRO and its partners during 1997-2001, but would ask the Senate Committee to consider the following matters in determining whether this science is applicable in the current circumstances (i.e. is the science fit for purpose).

Firstly, it must be noted that the research quoted by the CSIRO was conducted in an estuarine environment that has a high (but not unlimited) assimilative capacity. No research has ever been conducted on the release of aquaculture waste directly to near shore marine (coral reef) environments which have a very low assimilative capacity and have evolved in areas with very low sediment and nutrient loads (as was the case with the Guthalungra Prawn Farm proposal).

Secondly, the research quoted by the CSIRO was produced prior to the Australian Government's release of its National Water Quality Management Strategy (NWQMS) in July 2000. The NWQMS was a joint national approach to improving water quality in Australian and New Zealand waterways. It was originally endorsed by two Ministerial Councils - the former Agriculture and Resources Management Council of Australia and New Zealand (ARMCANZ) and the former Australian and New Zealand Environment and Conservation Council (ANZECC). The NWQMS aims to protect the nation's water resources, by improving water quality while supporting the businesses, industry, environment and communities that depend on water for their continued development.

The Water Quality Management Framework, used in the NWQMS, outlines a step-by-step process for planning, implementing and managing water quality projects. The Australian Government's policy document for implementing and managing water quality projects is the *Australian and New Zealand guidelines for fresh and marine water quality* (2000).

The *Australian and New Zealand guidelines for fresh and marine water quality* (2000) and associated documents provide a standardised framework for the assessment of potential impacts of proposed developments on the aquatic ecosystem health of these waterways. This Australian Government policy document was used by the GBRMPA to provide advice to the Australian Government's Minister for the Environment in assessing the proposed Guthalungra Prawn Farm proposal under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The four step process that the GBRMPA followed in providing assessment advice to the Minister under the EPBC Act fully complied with the policies and protocols described in the *Australian and New Zealand guidelines for fresh and marine water quality* (2000) and associated documents. Advice provided was as follows:

1. **Describe the proposed activity** – the activity undertaken is the placement of structures, the intake of seawater, and the discharge of aquaculture waste (sediment, nutrients) to the nearshore waters of the Great Barrier Reef Marine Park/World Heritage Area;
2. **Describe the receiving environment** – the waters receiving this waste discharge are located in the nearshore waters of the Great Barrier Reef Marine Park/World Heritage Area. The level of aquatic ecosystem protection is that of high conservation/ecological value. Current condition, as provided by the proponent, indicated that the waters of Abbot Bay were classified as being moderately to highly disturbed. The management intent for Abbot Bay waters was that the current water quality should not measurably deteriorate as a result of the proposed discharge and should improve towards achieving the default water quality trigger values for high conservation/ecological value (long-term goal).
3. **Predict potential impacts of proposed discharge on receiving waterway** – the management intent for the waters of Abbot Bay, based on the *Australian and New Zealand guidelines for fresh and marine water quality* (2000) and associated documents, is to halt the decline and reverse the adverse trend in water quality. Highly disturbed waters do not have any assimilative capacity. As the existing water quality objectives for Abbot Bay were not being met, then a significant environmental risk would be associated with the proposed discharge as further environmental harm was likely to occur. Table 1 described the relevant water quality objectives and current condition of relevant water quality indicators in Abbot Bay.

In the case of Abbot Bay, based on current condition and the relevant water quality objectives (Table 1), it is clear that there was no assimilative capacity available to process the discharge of aquaculture waste from the proposed Guthalungra Prawn Farm.

The discharge of approximately 26 tonnes on nitrogen from this proposed development to Abbot Bay waters would, if approved, represent an increase of approximately 6 per cent in the anthropogenic end of catchment load of nitrogen in the Don catchment.

The *Australian and New Zealand guidelines for fresh and marine water quality* (2000) and associated documents also provide specific guidance on when mixing zones may be used in the assessment of wastewater discharges to waterways. Guidance provided by the National Policy states that the maximum lateral dimension of a mixing zone

should be the lesser of 50 metres diameter or 30 per cent of the waterway width for riverine and estuarine waters and a radius not exceeding 100 metres from the diffuser port for coastal and marine waters. In contrast, the CSIRO quotes research that indicated that a full stream distance of 2000 metres was required for nutrient residues from prawn farm discharges to not be detected. This distance clearly does not comply with Australian Government policy as provided above.

The *Australian and New Zealand guidelines for fresh and marine water quality* (2000) and associated documents state that for potential developments in high conservation/ecological value waterways, the development application may include an environmental offset proposal seeking to deliver a net environmental gain to the waterway as a whole.

Table 1 Environmental values, water quality objectives and current conditions for Abbot Bay waters in the Great Barrier Reef World Heritage Area/Marine Park

Environmental values	Aquatic ecosystem health, primary recreation, secondary recreation, aquaculture	
Analyte	Water Quality Objective	Current condition
Total Nitrogen	≤ 100 ug/L	250 ug/L
Total Phosphorus	≤ 12 ug/L	50 ug/L
Total Suspended Sediment	≤ 2 mg/L (annual mean)	5 mg/L
Chlorophyll a	≤ 0.45 ug/L (annual mean)	0.84 ug/L

4. **Set circumstances, limits and monitoring conditions** – in March 2010 and later revised in November 2011, the then Minister for Sustainability, Environment, Water, Populations and Community issued an approval for the Guthalungra Prawn Farm proposal under the EPBC Act (2001/138) with a condition:

*that the environmental offset strategy must be designed to achieve annual no net increase to nutrient loads entering Abbot Bay.*

This condition does not require nutrient discharge concentrations to be zero at end of pipe, but requires a net environmental gain to the waters of Abbot Bay as a whole. This condition fully complies with the guidance provided in the *Australian and New Zealand guidelines for fresh and marine water quality* (2000) and associated documents.

Thirdly, consideration of the veracity of claims that the discharge of aquaculture waste has no impact on receiving waterways. Whilst the science indicates that nutrient loads discharged from prawn farms are not detectable 2000 metres below their discharge point, there are a number of statements made in these same published papers that give rise to a lower level of certainty surrounding potential aquatic ecosystem health impacts on receiving waterways.

Direct quotes from these research publications include:

- *...mangroves are assimilating nitrogen discharged from shrimp farms but the effects on mangrove forest health is unknown (Burford et al 2003, Attachment A);*
- *...impacts on the adjacent tidal flats inhabited by benthic microalgae, meiofauna and macrofauna are unknown (Burford et al 2003, Attachment A);*
- *The effects of shrimp farm discharges on biodiversity are largely unknown. High anthropogenic nutrient loads have been linked with a reduction in phytoplankton species diversity and the development of nuisance blooms, with negative ramifications for the ecological health of coastal ecosystems (Burford et al 2003, Attachment A);*
- *However, the cumulative and long-term impacts from the bank of nutrient rich particulate material, which is being moved downstream by tidal currents, are unknown. A sustainable load of farm discharge to this creek would be less than the current levels if precautionary principles were applied here (Trott and Alongi FRDC Project 97/212, Attachment B)*
- *Effluent from prawn farms is entering the food web of the tidal creek via the link between nutrients, phytoplankton, zooplankton and fish. ....However, altered fish communities (biomass and/or biodiversity) could lead to unpredictable effects that are undesirable, despite the obvious conclusion that there are more baitfish and hence more predatory fish in prawn farm discharge creeks (Trott and Alongi FRDC Project 97/212, Attachment B);*
- *This particulate matter was not fully assimilated by our study area, and moved into seaward regions of the creek (Trott and Alongi FRDC Project 97/212, Attachment B);*
- *Shrimp pond effluent generates muddy marine snow. This marine snow was not observed in non-impacted creeks (Wollanski et al 2000, Attachment C);*
- *Whilst this study has demonstrated some short term, direct effects of shrimp farm effluent in tidal creek-mangrove systems, little is known about long-term impacts. Further research is clearly warranted in view of the ecological and economic importance of mangroves (Wolanski et al 2000, Attachment C);*
- *Impacts of marine snow are evident on filter feeding organisms within 43 hours of exposure at levels currently found in creeks with prawn farm effluent discharges (in Fabricius 2005, Attachment D)*
- *Low-level sedimentation ( $\sim 12\text{mgcm}^{-2}$ ) when combined with transparent exopolymer particles (polysaccharides possibly exuded by bacteria and diatoms, called marine snow) kills newly settled coral recruits, whereas the same amount of sediment without the addition of marine snow does not reduce their short-term survival. Marine snow aggregates are found in high concentrations in coastal and inshore areas of the central Great Barrier Reef. They also show that short exposure to sediments (few days) can cause long-term effects in populations, by removing cohorts of young corals and thus retarding reef recovery after a disturbance (Fabricius 2005, Attachment D).*

I would ask the Senate committee to carefully consider the information provided in this response.

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**Senator Canavan asked:**

1. Respond to the CSIRO claims that, in 2008, GBRMPA established a standard of zero net emissions for aquaculture developments (made in CSIRO submission).

**Answer:**

The Great Barrier Reef Marine Park Authority (GBRMPA) has never implemented a policy nor applied an approval condition that has required any aquaculture development to achieve a zero net emission standard. The first time an approval condition similar to that described by the CSIRO was applied was in the Australian Government Minister for the Environment's decision to approve the Guthalungra Prawn Farm proposal under the EPBC Act on 4 March 2010 and later revised in 2 November 2011 (Attachment A and B).

It would appear that the CSIRO has interpreted the advice provided by the GBRMPA on this specific proposal, in a specific location and under specific conditions to be representative of a policy position for the aquaculture industry adjacent to the Great Barrier Reef World Heritage Area/Marine Park.

The Great Barrier Reef Marine Park Authority provided advice to the Minister on potential impacts associated with the discharge of aquaculture waste from the Guthalungra Prawn Farm proposal on the Great Barrier Reef World Heritage Area/Marine Park as part of the proposal's assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Great Barrier Reef Marine Park Authority had no regulatory role, other than the provision of advice, with respect to the EPBC Act assessment.

The Advice provided to the Minister was based on the assessment that existing water quality objectives for Abbot Bay were not being met and that there was a significant risk of further environmental harm associated with the proposed discharge. This assessment was based on the condition of the waters of Abbot Bay (as determined by the proponent) and the policies and procedures described in the Australian Government's National Water Quality Management Strategy, the *Australian and New Zealand guidelines for fresh and marine water*

*quality* – 2000 and associated documents to determine potential impacts of this proposal on the aquatic ecosystem health of Abbot Bay waters.

The condition of the waters of Abbot Bay were described as being moderately to highly disturbed, requiring a management intent that the water quality should not measurably deteriorate as a result of the proposed discharge and should improve towards achieving the default water quality trigger values for high conservation/ecological value (long-term goal). Highly disturbed waters do not have any assimilative capacity.

In November 2011, the then Minister for Sustainability, Environment, Water, Populations and Community issued an approval under the EPBC Act (2001/138) with a condition:

*that the environmental offset strategy must be designed to achieve annual no net increase to nutrient loads entering Abbot Bay.*

This condition does not require nutrient discharge concentrations to be zero at end of pipe, but requires a net environmental gain to the waters of Abbot Bay as a whole. This condition fully complies with the guidance provided in the *Australian and New Zealand guidelines for fresh and marine water quality* – 2000 and associated documents.