

Chapter 3

The Science: Health of the Great Barrier Reef

3.1 This chapter provides an overview of the scientific evidence on the health of the Great Barrier Reef, including:

- evidence that the Great Barrier Reef is in decline and the reasons behind this decline; and
- the importance of scientific work underpinning decision-making, including incorporation of the precautionary principle.

Decline of the reef

3.2 The evidence to the committee indicated that there has been a considerable decline of the health in the reef in recent years, and that the decline is continuing. As noted in Chapter 2, GBRMPA's *Outlook Report 2014* concluded that:

...the overall outlook for the Great Barrier Reef is poor, has worsened since 2009 and is expected to further deteriorate in the future. Greater reductions of all threats at all levels, Reef-wide, regional and local, are required to prevent the projected declines in the Great Barrier Reef and to improve its capacity to recover.¹

3.3 Many submissions and witnesses referred to a 2012 paper which showed that, in the past 27 years, the Great Barrier Reef has lost around 50 per cent of its coral cover.² Professor Peter Mumby of the Australian Coral Reef Society told the committee that 'the reef is in the worst state it has ever been since records began'.³ By 2050, he predicted that:

...the reef will be vastly less healthy than it is now...it would look pretty ugly. There would be very few corals, lots of big seaweed waving everywhere and relatively few fish.⁴

1 GBRMPA, *Outlook Report 2014*, p. vi.

2 See, for example, Professor Ove Hoegh-Guldberg and contributing authors (Professor Hoegh-Guldberg), *Submission 6*, p. 3; AIMS, *Submission 36*, p. 1; Professor John Pandolfi, Councillor and Past President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 5; Mr Anthony Brown, President, Whitsunday Charter Boat Industry Association, *Committee Hansard*, 22 July 2014, p. 9; Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 29; Mr Tony Fontes, *Committee Hansard*, 22 July 2014, p. 1; see also De'ath, Glenn et al, 'The 27-year decline of coral cover on the Great Barrier Reef and its causes', *Proceedings of the National Academy of Sciences of the United States of America*, 109(44), pp 17995–17999, <http://www.pnas.org/content/109/44/17995.full> (accessed 30 July 2014).

3 Professor Peter Mumby, President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 2.

4 Professor Peter Mumby, President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 5.

3.4 The committee heard that the decline in health is not uniform across the entire reef. The Australian and Queensland Governments submitted that the northern third of the reef and offshore areas 'remain in good condition', with 'southern inshore areas feeling the effects of human use and natural disasters'.⁵ As the *Outlook Report 2014* states:

...the northern third of the Great Barrier Reef Region has good water quality and its ecosystem is in good condition. In contrast, key habitats, species and ecosystem processes in central and southern inshore areas have continued to deteriorate from the cumulative effects of impacts. For example, the population of the iconic and culturally important dugong, which was already at very low levels compared with a century ago, has declined further in this part of the Region.⁶

3.5 The Cairns and Far North Environment Centre (CAFNEC) similarly noted that the health of the reef is 'considered to be much better north of Cooktown than south, particularly for inshore reefs'. CAFNEC suggested that the reason for this difference was due to 'the absence of large scale land based activities adjacent to the reef north of Cooktown'.⁷

3.6 Professor Ove Hoegh-Guldberg also told the committee that 'the threats and changes to the Great Barrier Reef are accelerating as opposed to slowing':

Fifty per cent of the corals in the Great Barrier Reef have disappeared since the early 1980s. If you had told me that in the early 1980s when I was exiting my university degree I would have said, 'That's impossible,' but it is happening and the pace is quickening.⁸

3.7 A key concern for many submitters and witnesses was the prospect that the decline of the reef could result in the listing of the Great Barrier Reef as 'World Heritage in Danger' by the World Heritage Committee.⁹

3.8 Professor Mumby expressed concern about the consequences of the decline of the reef and what might be lost for commercial fishing, the tourism industry, recreation, and coastal defences.¹⁰ The *Outlook Report 2014* similarly noted:

5 Australian and Queensland Governments, *Submission 34*, p. 6.

6 GBRMPA, *Outlook Report 2014*, p. v and see also p. 69; see also Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 25.

7 CAFNEC, *Submission 19*, p. 1; Mr Josh Coates, CAFNEC, *Committee Hansard*, 23 July 2014, p. 10.

8 Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 13.

9 See, for example, Professor Hoegh-Guldberg, *Submission 6*, p. 6; Professor John Pandolfi, Councillor and Past President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 2; Mr Tony Brown, President, Whitsunday Charter Boat Industry Association, *Committee Hansard*, 22 July 2014, pp 9 and 14.

10 Professor Peter Mumby, President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 6.

The Great Barrier Reef remains a significant economic resource for regional communities and Australia. Major changes to the condition of the ecosystem have social and economic implications for regional communities because some uses, such as commercial marine tourism and fishing, depend on an intact, healthy and resilient ecosystem.¹¹

3.9 A key concern was the impact on the tourism industry, and particularly the detrimental impact that a 'World Heritage in Danger' listing might have on the tourism industry.¹² For example, the Whitsunday Charter Boat Industry Association submitted that:

Commercial marine tourism is the largest direct contributor to economic activity in the region when compared to other reef-based industries. A loss of World Heritage status, or actual loss of ecological values....would have significant implications for the [Great Barrier Reef] tourism industry.¹³

3.10 Similarly, the Whitsunday Charter Boat Industry Association submitted that:

It has taken a long time to build the brand that is the World Heritage Great Barrier Reef and making the wrong decision could ruin that reputation.¹⁴

3.11 At the same time, some witnesses noted that a 'World Heritage in Danger' listing could spark 'last chance to see'-type tourism in the short term.¹⁵

3.12 However, the Australian and Queensland Governments submitted that they are 'determined to continue to manage and protect the World Heritage site for future generations' and 'do not consider that the Great Barrier Reef World Heritage Area warrants inclusion on the List of World Heritage in Danger'.¹⁶

Reasons behind the decline

3.13 The *Outlook Report 2014* identified the greatest risks to the Great Barrier Reef as climate change, poor water quality from land-based run-off, impacts from coastal development and remaining impacts from fishing.¹⁷ It further noted that:

These threats have the potential to work in combination to weaken the resilience of the Great Barrier Reef ecosystem and therefore its ability to

11 GBRMPA, *Outlook Report 2014*, p. v.

12 Professor Hoegh-Guldberg, *Submission 6*, p. 6 and *Committee Hansard*, 21 July 2014, p. 10; Whitsunday Charter Boat Industry Association, *Submission 46*, p. 8; Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 30; Mr Anthony Brown, President, Whitsunday Charter Boat Industry Association, *Committee Hansard*, 22 July 2014, p. 14.

13 Whitsunday Charter Boat Industry Association, *Submission 46*, p. 8; see also, for example, Mr Jeremy Tager, *Committee Hansard*, 23 July 2014, p. 5.

14 Whitsunday Charter Boat Industry Association, *Submission 46*, p. 10.

15 See, for example, Mr Colin McKenzie, Executive Director, Association of Marine Park Tourism Operators, *Committee Hansard*, 23 July 2014, pp 37–38; Professor Ove Hoegh-Guldberg, *Submission 6*, p. 6 and *Committee Hansard*, 21 July 2014, p. 10.

16 Australian and Queensland Governments, *Submission 34*, p. 9.

17 GBRMPA, *Outlook Report 2014*, p. v.

recover from serious disturbances (such as major coral bleaching events) that will become more frequent in the future.¹⁸

3.14 The Australian Institute of Marine Science (AIMS) similarly submitted that the Great Barrier Reef:

...faces pressures from multiple sources, ranging from coral bleaching events, a series of severe cyclones, Crown of Thorns Starfish outbreaks, declining water quality from agriculture run-off and dredging operations. Understanding of the impact of these stressors on the Reef, especially their cumulative impacts and the Reef's capacity to respond to these stresses (its resilience) is critical for ongoing effective management.¹⁹

3.15 This section contains some general observations about the relative contributions of these threats and the key underlying causes. The issues of climate change, and storms and cyclones are discussed further later in this chapter. Water quality from catchment run-off, crown-of-thorns starfish and coastal development is discussed in further detail in the next chapter. A more specific consideration of coastal development relating to ports and shipping, including dredging and disposal, is contained in Chapters 5 and 6.

3.16 While there appeared to be scientific consensus on the causes of the decline of the reef, there was some discussion during the committee's inquiry about the relative contributions of the various threats to the Great Barrier Reef. Dr Jamie Oliver of AIMS observed that, amongst scientists, 'there is general consensus' about the threats, but perhaps not 'full consensus on the relative priorities and contributions to the overall decline that these threats represent'. He suggested that this 'requires further research, to be honest, and further discussion'.²⁰

3.17 Professor Peter Mumby agreed that 'most scientists agree about what is happening to the reef...I do not really believe that the scientific community are in that much disagreement. They argue about the details...but, on the major issues, the major threats, I think people are pretty much in agreement'.²¹

3.18 Professor Hoegh-Guldberg similarly submitted that:

There is strong scientific consensus that key Great Barrier Reef ecosystems such as reef building corals are showing declining trends in condition due to continuing poor water quality, cumulative impacts of climate change, and increasing intensity of extreme events.²²

18 GBRMPA, *Outlook Report 2014*, p. 264; see also Professor Hoegh-Guldberg, *Submission 6*, p. 1.

19 AIMS, *Submission 36*, p. 1; Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 18.

20 Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 20; see also Mr Jon Brodie, *Committee Hansard*, 23 July 2014, p. 26.

21 Professor Peter Mumby, President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 2.

22 Professor Hoegh-Guldberg, *Submission 6*, p. 3.

3.19 As noted earlier, many submissions and witnesses referred to a 2012 study by AIMS which showed that, in the past 27 years, the Great Barrier Reef has lost around 50 per cent of its coral cover. The study attributed the decline to tropical cyclones (48 per cent), coral predation by the crown-of-thorns starfish (COTS) (42 per cent), and coral bleaching (10 per cent).²³ This study was relied on by some submitters and witnesses to identify these as the main reasons for the decline in the Great Barrier Reef. For example, Shipping Australia submitted that it is aware of:

...studies that have been carried out with respect to causes of coral death on the Great Barrier Reef and we have no reason to doubt the findings that climate-change induced coral bleaching, damage from adverse weather events (cyclones) and predatory activities of the crown of thorns starfish that is native to Australian waters are the main reasons for their demise.²⁴

3.20 However, other submitters and witnesses cautioned against over-reliance on this study.²⁵ For example, Mr Coates of CAFNEC told the committee to:

Read the very second sentence of the very first paragraph of that paper, which does point out that dredging and dumping is a serious threat to the reef and really consider the broader picture. They are the causes of damage to coral, but the underlying problem is the resilience of the reef, its rate of recovery. That is intrinsically linked to water quality, which is of course intrinsically linked to a range of factors, including dredging and dumping.²⁶

3.21 Professor Pandolfi of the Australian Coral Reef Society similarly cautioned that the study 'did not consider all sources of mortality' and suggested that 'the real issue is not what killed [the corals]; it is why aren't they recovering?'.²⁷

3.22 Indeed, the committee heard from AIMS itself that this study was limited in some respects, and that there are a range of other interacting factors. In particular, Dr Oliver of AIMS told the committee that the dataset on which the paper focused was 'biased towards mid-shelf to offshore reefs', and 'probably likely to underestimate the impacts of water quality'. He explained that:

23 Professor Hoegh-Guldberg, *Submission 6*, p. 3; Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 12; Property Rights Australia, *Submission 9*, p. 1; Australian and Queensland Governments, *Submission 34*, p. 8; see also De'ath, Glenn et al, 'The 27-year decline of coral cover on the Great Barrier Reef and its causes', *Proceedings of the National Academy of Sciences of the United States of America*, 109(44), pp 17995–17999.

24 Shipping Australia, *Submission 3*, p. 4; see also, for example, Mr David Anderson, Chief Executive Officer, Ports Australia, *Committee Hansard*, 21 July 2014, p. 23.

25 See, for example, CAFNEC, *Submission 19*, p. 3; Mr Josh Coates, CAFNEC, *Committee Hansard*, 23 July 2014, p. 10.

26 Mr Josh Coates, Marine Program Coordinator, CAFNEC, *Committee Hansard*, 23 July 2014, p. 10.

27 Professor John Pandolfi, Councillor and Past President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 6.

...we did not explicitly include water quality or dredging or other issues in the analysis. We really cannot comment on whether or not these other issues are a particularly important cause of coral decline, particularly in inshore reefs, because that was not the hypothesis we addressed in the paper. As we even point out in the paper itself, in the discussion and introduction, these other factors are important generally on the Great Barrier Reef and need to be looked at in more detail.²⁸

3.23 He further explained that:

We did not have really good comprehensive information on water quality or other threats and we did not put that into the analysis. But we know from other studies that these are important. Particularly in local areas, we know that dredging can kill corals. For water quality, it is well understood that there is a major threat particularly to inshore and coastal coral reefs. That just did not get included in the analysis, because we were actually doing a different type of analysis.²⁹

3.24 Several submissions and witnesses identified climate change and poor water quality as two of the key underlying issues behind the decline of the reef, and that these are linked to crown-of-thorns starfish outbreaks, coral bleaching and the resilience of the reef to recover from storms and cyclones.³⁰

3.25 For example, Professor Hoegh-Guldberg identified the two core issues as climate change and water quality. He submitted that climate change as 'undoubtedly the most serious threat to the [Great Barrier Reef] over the longer term', with declining water quality as a challenge over the short term.³¹ He told the committee that:

...the health of the Great Barrier Reef is declining rapidly as a result of deteriorating water quality and climate change. The evidence of this is undeniable...It is as a result of multiple disturbances. Things like crown of the thorns outbreaks are linked to water quality...Things like recovery from storms are linked to water quality...We are increasing the cumulative impacts that are making it harder for it to come back from disturbances...³²

3.26 Professor Hoegh-Guldberg further submitted that:

28 Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 22.

29 Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 22.

30 See, for example, Professor John Pandolfi, Councillor and Past President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 5; Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 8; Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 29; CAFNEC, *Submission 19*, p. 3.

31 Professor Hoegh-Guldberg, *Submission 6*, p. 3; see also Professor Peter Mumby, President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 5; and Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, pp 8 and 10.

32 Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 8.

...impacts from disturbances such as cyclones, COTS and bleaching are clearly aggravated by a background decline in the health and hence ability of corals to grow back after disturbances...³³

3.27 The committee further notes that the *Outlook Report 2014* stated:

In recent years, a series of major storms and floods have affected an ecosystem already under pressure. The accumulation of all impacts on the Reef has the potential to further weaken its resilience. This is likely to affect its ability to recover from serious disturbances, such as major coral bleaching events, which are predicted to become more frequent in the future.³⁴

3.28 Indeed, the *Outlook Report 2014* noted that there is concern that the resilience of the Great Barrier Reef is being seriously, and increasingly rapidly, eroded.³⁵ The report acknowledged that:

The emerging loss of ecosystem resilience is particularly critical in the context of the projected major increase in the effects of climate change impacts and the lag time between improved land management practices and observable ecosystem improvements...As these effects worsen, it is very likely that interactions between climate-related threats and other threats will have increasingly serious consequences.³⁶

Climate change

3.29 As noted above, many submitters and witnesses highlighted climate change as a major contributor to the decline of the health of the Great Barrier Reef. For example, Dr Chris McGrath told the committee that 'the major issue for the reef is the enormous threat that climate change and ocean acidification pose'.³⁷ Professor Hoegh-Guldberg described climate change as 'undoubtedly the most serious threat' to the Great Barrier Reef 'over the longer term'.³⁸

3.30 Indeed, the *Outlook Report 2014* similarly states that 'climate change remains the most serious threat to the Great Barrier Reef':

It is already affecting the Reef and is likely to have far-reaching consequences in the decades to come. Sea temperatures are on the rise and this trend is expected to continue, leading to an increased risk of mass coral bleaching; gradual ocean acidification will increasingly restrict coral

33 Professor Hoegh-Guldberg, *Submission 6*, p. 3.

34 GBRMPA, *Outlook Report 2014*, p. v.

35 GBRMPA, *Outlook Report 2014*, p. 243.

36 GBRMPA, *Outlook Report 2014*, p. 243.

37 Dr Chris McGrath, *Committee Hansard*, 21 July 2014, p. 1.

38 Professor Hoegh-Guldberg, *Submission 6*, p. 3; see also, for example, Mr Jon Brodie, *Committee Hansard*, 23 July 2014, p. 25; Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 29.

growth and survival; and there are likely to be more intense weather events.³⁹

3.31 The *Outlook Report 2014* further notes that:

The impacts of increasing ocean temperatures and ocean acidification will be amplified by the accumulation of other impacts such as those caused by excess nutrient run-off.⁴⁰

3.32 The committee received evidence that the two key impacts of climate change on the Great Barrier Reef relate to increased temperatures and ocean acidification. In terms of increased temperatures, Professor Hoegh-Guldberg explained that 'rising sea temperatures pose serious threats to reef-building corals which undergo mass coral bleaching and mortality'. He cited research which indicates that:

Prior to 1979, there were no scientific reports of mass coral bleaching and mortality, however, over the past 25 years there has been numerous bleaching events which have had significant damage to coral reefs world-wide...In two separate events, 1998 and 2002, over 50% of the Great Barrier Reef was affected, with the loss of corals estimated to be around 10%. By mid-century, it is expected that such events will result in the loss of close to 100% of corals on the GBR.⁴¹

3.33 Professor Terry Hughes told the committee that these bleaching events demonstrate 'the impacts of climate change have been happening for some time' and 'will increase in frequency and severity as global warming continues'.⁴²

3.34 In terms of ocean acidification, Professor Hoegh-Guldberg explained that rising levels of carbon dioxide (CO₂) in the atmosphere, generated by the burning of fossil fuels, are being absorbed by the upper layers of the ocean:

On entering the ocean, CO₂ reacts with water to create a dilute acid (Carbonic acid) subsequently reducing the pH of the ocean, while at the same time decreasing the carbonate ion concentration. The pH of the upper layers of the ocean has decreased by 0.1 pH units since the advent of the industrial revolution...There is now a growing body of experimental evidence that shows that coral growth and calcification decrease substantially as the concentration of CO₂ increases.⁴³

3.35 Professor Hoegh-Guldberg summarised that 'in combination, increased temperature and acidity both kill corals and dissolve the reef framework'. He told the committee the consensus in the most recent Intergovernmental Panel on Climate Change report is that:

39 GBRMPA, *Outlook Report 2014*, p. v.

40 GBRMPA, *Outlook Report 2014*, p. v.

41 Professor Hoegh-Guldberg, *Submission 6*, p. 7.

42 Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 29.

43 Professor Hoegh-Guldberg, *Submission 6*, p. 7.

...if we keep up the rate of temperature change, average global temperature and the rate at which we are acidifying the ocean, which I should point out is the highest in 65 million years, we will not have much of a reef in terms of a coral dominated ecosystem by the middle of this century.⁴⁴

3.36 Several submissions and witnesses stressed that that factors such as climate change and water quality impact on the reef's ability and resilience to recover from other impacts, such as tropical cyclones and the crown-of-thorns starfish.⁴⁵ For example, Professor Hoegh-Guldberg described the reef as a 'prize fighter' that is getting sicker all round.⁴⁶

3.37 Professor John Pandolfi told the committee that reducing 'local stressors on the reef' means that the reef 'will have a much better chance of being resilient to the climate change effects'.⁴⁷

3.38 Dr McGrath similarly considered that 'the major issue for the reef is the enormous threat that climate change and ocean acidification pose'.⁴⁸ Dr McGrath was concerned that there is a danger of 'becoming lost in the detail of relatively localised threats to the [Great Barrier Reef], such as port expansions, and miss the bigger picture of the immense and widespread threat that climate change and ocean acidification pose to the reef system'.⁴⁹

3.39 To address the issue of climate change, submissions emphasised the need to reduce greenhouse gas emissions from fossil fuels and deforestation.⁵⁰ For example, Dr McGrath submitted that:

Australia must take strong and comprehensive measures to reduce greenhouse gas emissions. Such measures should include setting policy targets for stabilising atmospheric greenhouse gas concentrations and limiting increases in global temperatures.⁵¹

3.40 Dr McGrath described our current emissions reduction target of five per cent by 2020 as 'woefully inadequate'. He also suggested that most of Australia's coal reserves should be left in the ground, and that we should not be allowing the further development of new coal mines.⁵²

44 Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 10.

45 Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 10.

46 Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 10.

47 Professor John Pandolfi, Councillor and Past President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 5.

48 Dr Chris McGrath, *Committee Hansard*, 21 July 2014, p. 1 and *Submission 32*, p. 2.

49 Dr Chris McGrath, *Submission 32*, p. 1.

50 Professor Hoegh-Guldberg, *Submission 6*, p. 8.

51 Dr Chris McGrath, *Submission 32*, p. 3.

52 Dr Chris McGrath, *Submission 32*, p. 4 and *Committee Hansard*, 21 July 2014, p. 2.

3.41 Similarly, Professor Hoegh-Guldberg told the committee that 'a failure to deal with the overriding climate issue will make all efforts meaningless' and that it is 'quite incredible' that Australia is 'expanding activities that will drive increasing amounts of fossil fuels into the global market at a time when we know that we will kill the reef'.⁵³

3.42 Professor Hughes agreed:

Australia has one of the highest per capita CO₂ emissions in the world, and the government policy is to triple our exports of coal over the next 25 years, which of course is completely counter to the stated aim of reducing Australia's CO₂ emissions.⁵⁴

3.43 However, Mr Michael Roche of the Queensland Resources Council told the committee that while they fully support action on climate change, 'coal will continue to be a major source of satisfying the world's energy demand'. He further suggested that 'the strategy of focusing on coal or gas exports out of Australia does nothing to deal with global emissions. Where there is demand for coal, the produce will be supplied'.⁵⁵

3.44 The committee notes that the *Outlook Report 2014* states:

The extent and persistence of these [climate] impacts depends to a large degree on how effectively the issue of rising levels of greenhouse gases is addressed worldwide.⁵⁶

3.45 In response to questions as to the role of Australia in reducing greenhouse gas emissions reduction, and whether Australia can achieve sufficient greenhouse gas reductions on its own, Dr McGrath told the committee that Australia should be at the forefront:

We are the biggest exporter of coal in the world...so we are a major player in the fossil fuel market in the world...it is like, say, the World Cup in football: we send a team and they play. We have to engage as well as we can and then other teams come from other countries and they help...The reality is a lot of other countries are taking serious action to respond to this, and Australia should be at the forefront.⁵⁷

3.46 Similarly, Professor Pandolfi of the Australian Coral Reef Society told the committee that 'we need to act responsibly on a global stage to begin to reduce

53 Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 8.

54 Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 29; see also, for example, NQCC, *Submission 30*, p. 3.

55 Mr Michael Roche, Chief Executive, Queensland Resources Council, *Committee Hansard*, 21 July 2014, p. 32 and see also p. 35.

56 GBRMPA, *Outlook Report 2014*, p. v.

57 Dr Chris McGrath, *Committee Hansard*, 21 July 2014, p. 4.

emissions so that we can reduce the effects of warming and high CO₂ in our Great Barrier Reef waters'.⁵⁸

3.47 Mr Jeremy Tager further told the committee that:

...making the Galilee Basin [in Queensland] into the largest coalmining area in the world and sending that overseas through the Great Barrier Reef in order for it to be burnt to contribute to climate change that will further kill the reef makes us as much responsible as anybody in the world.⁵⁹

3.48 Other submissions also noted the need to consider the impacts of climate change, and the need for adaptation strategies, in the context of planning and management in the Great Barrier Reef region.⁶⁰

Storms and cyclones

3.49 As noted earlier in this chapter, a large part of the decline in the reef's coral cover has been attributed to tropical storms and cyclones. The *Outlook Report 2014* notes that there were six category 3 or above cyclones that affected the Great Barrier Reef between 2005 and 2013, which caused significant damage to coral reef habitats.⁶¹

3.50 However, several submitters and witnesses cautioned that tropical cyclones and storms have always been an issue for the reef, and the key problem now is that the reef's ability to recover from these storms is impaired by other contributing factors. As Professor Hughes observed, 'It is very convenient to blame the weather, like cyclones, but we have always had cyclones. Cyclones are basically background mortality'.⁶²

3.51 Professor Mumby of the Australian Coral Reef Society explained:

Tropical storms have been with us forever and they have not been a long-term problem because, once a reef has been impacted, it can quickly recover.⁶³

3.52 Professor Mumby further explained that:

There is no question that tropical storms have had a significant impact on the reef as they always do. We have just been through a period of very high intense activity, but the real problem is that the recovery rate of reefs may be impaired...If you start reducing the rate of recovery, then things like

58 Professor John Pandolfi, Councillor and Past President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 5.

59 Mr Jeremy Tager, *Committee Hansard*, 23 July 2014, p. 5.

60 See, for example, Professor Hoegh-Guldberg, *Submission 6*, p. 8; Professor Barbara Norman, *Submission 49*, pp 2–3; Ms Margaret Moorhouse, Spokesperson, Alliance to Save Hinchinbrook, *Committee Hansard*, 23 July 2014, p. 11.

61 GBRMPA, *Outlook Report 2014*, pp 48–49; see also Dr Russell Reichelt, Chairman and Chief Executive, GBRMPA, *Committee Hansard*, 23 July 2014, pp 53–54.

62 Professor Terry Hughes, *Committee Hansard*, 23 July 2014, p. 29.

63 Professor Peter Mumby, President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 6.

cyclones will have a longer, more persistent impact, which is one of the reasons why they can be such a problem.⁶⁴

3.53 Professor Hoegh-Guldberg similarly submitted that 'there is limited evidence that demonstrates that the frequency and intensity of cyclones has increased dramatically within the [Great Barrier Reef] region'. As mentioned above, he suggested that their impacts (along with other impacts) 'are clearly aggravated by a background decline in the health and hence ability of corals to grow back after disturbances'.⁶⁵ Professor Hoegh-Guldberg further explained that the impact that storms and cyclones are having on the Great Barrier Reef is linked to other problems, such as water quality:

Storms have occurred over thousands of years, but corals have bounced back very quickly. If you do not have storms coming more than every 10 years the reef still survives, but what we have done with the water quality is that the corals are being poisoned by pesticides, nutrients and sediments and they [are] just not going back fast enough to keep up with the big storms that come through.⁶⁶

Scientific work underpinning decision-making

3.54 This section examines:

- the importance of science, including monitoring and research, to support management and decision-making in relation to the Great Barrier Reef;
- areas for further research;
- need for independent scientific work and evidence; and
- whether decision-making in relation to the Great Barrier Reef is consistent with the precautionary principle.

Importance of scientific research and monitoring

3.55 The committee received evidence emphasising the important role of scientific research and monitoring in supporting decision-making in relation to the Great Barrier Reef.

3.56 The Australian and Queensland Governments submitted that there are a range of research providers within the Great Barrier Reef region, including:

...the Australian Institute of Marine Science (AIMS), CSIRO, government agencies (such as GBRMPA, the Queensland Parks and Wildlife Service and the Queensland Department of Agriculture, Fisheries and Forestry) and

64 Professor Peter Mumby, President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 6.

65 Professor Hoegh-Guldberg, *Submission 6*, p. 3.

66 Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 12.

universities, as well as by commercial companies and consultants, stakeholders, Traditional Owners and community members.⁶⁷

3.57 They also referred to research investment through the National Environmental Research Program (NERP) Tropical Ecosystems Hub, which is:

...addressing critical issues for management, conservation and sustainable use of the GBRWHA and its catchments, tropical rainforests including the Wet Tropics World Heritage Area...⁶⁸

3.58 The Australian Coral Reef Society submitted that 'science is now playing a stronger role than ever in supporting day-to-day decision making', such as how to intervene to mitigate crown-of-thorns starfish outbreaks. The Australian Coral Reef Society further submitted that:

...programmes like the National Environmental Research Programme (NERP) are proving to be effective in providing the science to help manage the reef and undertake cost-effective interventions. Management agencies have excellent links with the research community and the NERP provides a great example for having researchers work closely with managers and industry.⁶⁹

3.59 Professor Hoegh-Guldberg noted that 'it is important that State and Federal governments heed the conclusions of the best science for responding to any threats' to the Great Barrier Reef. He further expressed the view that GBRMPA 'has developed a clear understanding of the major threats to the health of the Great Barrier Reef', by engaging with national and international scientific communities and through State of the Reef and Outlook Reports.⁷⁰ Professor Hoegh-Guldberg further noted that the research community is looking forward to being involved in the future planning and management of the Great Barrier Reef, including the Reef 2050 Plan:

The scientific community can provide the evidence-base necessary for future decision-making regarding the sustainability and resilience of the [Great Barrier Reef].⁷¹

3.60 AIMS also expressed support for GBRMPA's use of science and its communication with the scientific community:

GBRMPA uses science evidence from multiple sources to support decision-making, including long-term baselines and an in-depth system-level understanding to predict environmental risk. GBRMPA regularly communicates with the scientific community both to seek advice on current management issues, to stay abreast of current scientific understanding of

67 Australian and Queensland Governments, *Submission 34*, p. 27; see also Dr Sue Pillans, *Committee Hansard*, 21 July 2014, p.11.

68 Australian and Queensland Governments, *Submission 34*, p. 27.

69 Australian Coral Reef Society, *Submission 8*, p. 2.

70 Professor Hoegh-Guldberg, *Submission 6*, p. 4; see also p. 2 and Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 13.

71 Professor Hoegh-Guldberg, *Submission 6*, p. 7.

the status, threats, and vulnerabilities of the [Great Barrier Reef] and communicate its research priorities to the scientists.⁷²

Monitoring

3.61 Other submitters and witnesses also noted the need for ongoing monitoring of the health of the Great Barrier Reef. For example, Professor Hoegh-Guldberg submitted that:

The most fundamental information required for sound environmental management to ensure the long term health of the reef is knowledge of, and capability to measure, what is in the environment and how it is changing over time.⁷³

3.62 AIMS similarly highlighted that the need for 'effective monitoring to support management decisions' is 'greater than ever, and will increase as cumulative pressures on the GBRWHA grow under global and regional environmental change'. AIMS expressed support for an Integrated Monitoring Program (IMP) to 'comprehensively link historical trends to present-day status and to risks under projected environmental conditions'. AIMS noted that such a program was proposed in the Strategic Assessment Program Report, and suggested that:

...the proposed IMP should be developed as soon as possible and that significant resources will be needed to both fill gaps in the existing coverage of key indicators and to develop and monitor new indicators that will arise from the decision to adopt a target-based management approach for the GBRWHA.⁷⁴

3.63 A representative of the Department of the Environment noted that the Strategic Assessment for the Great Barrier Reef Marine Park did look at 'creating an integrated monitoring system', which he suggested will be 'very important for across the reef in tracking its overall health and progress'.⁷⁵

3.64 The Australian and Queensland Governments referred to a number of initiatives to monitor the health of the reef, including the GBRMPA Outlook Reports (as outlined in the previous chapter). The Australian and Queensland Governments submitted that the Outlook Reports play an important role in the management of the area:

To address the challenges facing the Reef, while achieving the greatest value for the available resources, GBRMPA's management must be well-targeted, knowledge-based, scientifically robust and measureable. GBRMPA regularly reviews its management priorities and arrangements, including through the Outlook Report, to ensure its resources are applied

72 AIMS, *Submission 36*, p. 3.

73 Professor Hoegh-Guldberg, *Submission 6*, p. 4; see also p. 2 and Professor Ove Hoegh-Guldberg, *Committee Hansard*, 21 July 2014, p. 13.

74 AIMS, *Submission 36*, p. 4; see also Minerals Council of Australia, *Submission 35*, p. 9.

75 Mr Dean Knudson, First Assistant Secretary, Department of the Environment, *Committee Hansard*, 21 July 2014, p. 55.

most effectively to achieve the long-term protection, ecologically sustainable use, understanding and enjoyment of the Great Barrier Reef.⁷⁶

3.65 In terms of monitoring, some witnesses and submitters also mentioned the 'Eye on the Reef' monitoring program, which enables reef users to collect information and report sighting and observations to GBRMPA.⁷⁷ The *Outlook Report 2014* acknowledges that:

Reef health monitoring information provided by tourism operators through the Great Barrier Reef Marine Park Authority's Eye on the Reef program improves the information available for decision making. Monitoring information is better integrated, and the program has a user-friendly data portal and online training.⁷⁸

Australian Institute of Marine Science (AIMS)

3.66 As noted above, one of the key research providers is AIMS, which is a Commonwealth statutory authority established under the *Australian Institute of Marine Science Act 1972*. Its functions include carrying out research and development in relation to marine science and marine technology. It has a staff of 198 (average full-time equivalent) and its total revenue (from government and external sources in 2012-13) was \$51.7 million.⁷⁹

3.67 AIMS explained its role as a 'key independent science provider and adviser' to GBRMPA, which uses its science and advice 'across a range of issues to develop improved monitoring programs and adaptive management solutions as part of a long-term sustainability plan for the Reef'.⁸⁰

3.68 Dr Oliver stated that one of their 'primary goals is to provide the evidence base for sound environmental decision making' and that it had 'established strong links' to environmental regulators and industry, governments and especially the Great Barrier Reef Marine Park Authority. He further told the committee that:

GBRMPA has consistently identified good science as a key foundation to effective management and has consistently supported relevant research and sought expert scientific advice on controversial issues where there is residual uncertainty.⁸¹

76 Australian and Queensland Governments, *Submission 34*, p. 28; see also Dr Kimberley Dripps, Deputy Secretary, Department of the Environment, 21 July 2014, p. 54.

77 See, for example, Mrs Jan Claxton, *Committee Hansard*, 22 July 2014, p. 3; Mr Allen Grundy, Director, Southern Cross Sailing Adventures, *Committee Hansard*, 22 July 2014, p. 41; see also GBRMPA, *Eye on the Reef program*, <http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/eye-on-the-reef> (accessed 20 August 2014).

78 GBRMPA, *Outlook Report 2014*, p. 202.

79 AIMS, *Annual Report 2012–13*, pp 55, 77 and 131.

80 AIMS, *Submission 36*, p. 1.

81 Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 18.

3.69 However, the committee also heard that the AIMS has had to accommodate an \$8 million cut to its budget for 2014–15. Dr Oliver explained that AIMS is trying not 'to make any structural changes to the organisation' and to 'maintain our underlying capacity to do research' but that:

...we would have to cut back to some extent on some of the fundamental research that provides the long-term building blocks for the more applied research that we do. There are a number of areas that we may decide to cut back on as a result of that—that is inevitable when you get a cut—but we are confident that we will maintain our capacity to do this research.⁸²

3.70 However, some witnesses and submitters expressed concern about whether there is sufficient funding for research for the reef. For example, The North Queensland Conservation Council (NQCC) identified that 'GBRMPA and related research organisations need to be funded at a level to ensure that all necessary research is undertaken as a matter of priority'. Ms Tubman of NQCC told the committee that they 'would like to see greater funding for science in GBRMPA but also in AIMS and in CSIRO'.⁸³ Funding for GBRMPA is also discussed further in Chapter 8.

Gaps and areas for further research

3.71 Several key areas for further research were identified during the committee's inquiry. Some of these are discussed elsewhere in this report, in the relevant chapter discussing specific issues (for example, there is discussion in Chapter 5 in relation to ports and the need for more research on the longer term dispersal of dredge spoil). Other more general needs and approaches are discussed here.

3.72 The committee notes that the *Outlook Report 2014* stated that while there have been 'significant improvements in understanding of the region's values and impacts' since the 2009 report, 'important information gaps still exist'.⁸⁴ It identified, for example, in relation to biodiversity:

...the assessment of many habitats and species or groups of species is principally based on limited evidence and anecdotal information. Key gaps in knowledge include understanding of deeper reefs and deep-water seagrass meadows, islands, and identification of new biodiversity hotspots. Biological and ecological information is lacking on inshore dolphins and populations of seabirds that breed in the Great Barrier Reef as well as some targeted 'at risk' fishery species and populations of bycatch species. Sea snakes and some shark and ray populations are poorly understood as are turtle populations after migration out of the Marine Park.⁸⁵

82 Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 24; see also Mr John Gunn, Chief Executive Officer, AIMS, *Senate Environment and Communications Committee Estimates Hansard*, 2 June 2014, pp 64– 65.

83 Ms Wendy Tubman, Coordinator, NQCC, *Committee Hansard*, 23 July 2014, p. 1; see also NQCC, *Submission 30*, p. 4.

84 GBRMPA, *Outlook Report 2014*, p. vi.

85 GBRMPA, *Outlook Report 2014*, p. 37.

3.73 Professor Hoegh-Guldberg suggested there is also a need for a better mapping of the reef, including:

...all reef locations/boundaries, their dimensions (depth) and their composition in terms of benthic communities and substrate types, and in more detail the amount of coral cover. Currently there are no existing maps and no plan to establish a baseline map or to regularly update a map that provides details of the location, depth and composition (benthic communities and substrate types) of the entire Great Barrier Reef.⁸⁶

3.74 AgForce recommended that a single searchable database be created of all reef reports and publications, noting that 'from an industry perspective, it is difficult to know where to look for relevant reef reports'. They suggested that this would reduce duplication and the 'disconnect' between reef research and development and industry research and development.⁸⁷ The Minerals Council of Australia agreed that 'improved communication and access to information will be important for building public confidence' in the management of the Great Barrier Reef.⁸⁸

3.75 Dr Oliver told the committee that 'there is much we do not know about the reef ecosystems and the complex interactions that will determine their response to changing climate, coastal development and increased use' and that:

Support for this research to address these knowledge gaps has been provided through a variety of initiatives by the state and federal government. Ongoing support is essential in order to reduce the uncertainty in environmental management decisions that underpins much of the controversy surrounding the reef today.⁸⁹

3.76 AIMS highlighted that there is an 'increasing number and complexity of issues facing management agencies for the Great Barrier Reef World Heritage Area', meaning that decision-making needs to draw on 'an exponentially increasing volume of information'. AIMS were concerned that:

Fully dealing with this complexity and information load requires both capability and capacity that may exceed GBRMPA's current resources, both in terms commissioning the acquisition or collation of empirical data and interpreting these in a policy, decision-making context. Additional resources would allow for significant improvements in the timeliness and quality of decisions and policies to protect the GBR.⁹⁰

3.77 AIMS identified that GBRMPA 'has substantial additional science information needs relating to the development of policies and management plans and

86 Professor Hoegh-Guldberg, *Submission 6*, p. 4.

87 AgForce Queensland, *Submission 14*, p. 5 and see also pp 9–10 and Mr Charles Burke, Chief Executive Officer, AgForce Queensland, *Committee Hansard*, 21 July 2014, p. 38.

88 Minerals Council of Australia, *Submission 35*, p. 9.

89 Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 19.

90 AIMS, *Submission 36*, p. 2; see also Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 19.

day to day management'. As noted earlier, much of this research is 'carried out by research institutions' such as AIMS, CSIRO, universities and NERP. However, AIMS was concerned that:

GBRMPA is only able to influence the research agenda of these agencies indirectly, through publication of its research priorities and other forms of communication. In general, the information needs articulated by GBRMPA significantly exceed the resources available from all the above sources, so it is important that a careful prioritisation of research, taking which considers needs, feasibility and timescales for results is carried out.⁹¹

3.78 Dr Oliver of AIMS suggested that this prioritisation of research could be achieved through the development of a 'collaborative [Great Barrier Reef] Strategic Research Plan' involving GBRMPA, Commonwealth and State Governments and key research providers.⁹²

3.79 The Australian and Queensland Governments stated that the Australian Government had invested in new research to inform the Strategic Assessment of the GBRWHA, targeted to address 'key information gaps relating to the future management of the Great Barrier Reef'. The Strategic Assessments are discussed further elsewhere in this report.⁹³ The Australian and Queensland Governments also noted that:

Key information needs to improve management of the Reef are also identified in GBRMPA's Scientific information needs for the management of the Great Barrier Reef Marine Park 2009–2014. This document, along with partnership agreements with key research institutions, provides the basis for focusing research on matters relevant to the long-term protection and management of the Reef.⁹⁴

Independence of scientific work

3.80 Many submitters and witnesses supported the need for science underpinning decision-making to be independent and apolitical.⁹⁵ A key issue raised by some in this context was the fact that regulatory decision-making is often underpinned by scientific work and environmental assessments which are commissioned and provided by

91 AIMS, *Submission 36*, p. 3; see also Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 19.

92 AIMS, *Submission 36*, p. 3; see also Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 19.

93 Australian and Queensland Governments, *Submission 34*, p. 27.

94 Australian and Queensland Governments, *Submission 34*, p. 27; see also GBRMPA, *Scientific Information Needs for the Management of the Great Barrier Reef Marine Park 2009–2014*, http://www.gbrmpa.gov.au/data/assets/pdf_file/0019/3376/GBRMPA_Scientific_Information_Needs.pdf (accessed 6 August 2014).

95 See, for example, Queensland Ports Association, *Submission 13*, p. 15; AgForce, *Submission 14*, p. 7; Minerals Council of Australia, *Submission 35*, p. 8; Whitsunday Residents Against Dumping, *Submission 39*, p. 3; Whitsunday Charter Boat Industry Association, *Submission 46*, p. 9; Ms Wendy Tubman, NQCC, *Committee Hansard*, 23 July 2014, p. 1.

proponents. In particular, several submissions and witnesses expressed concern that environmental assessment documentation is prepared by the proponent (or consultants commissioned by the proponent), rather than by an independent third party. It was suggested that the fact that the work is commissioned and provided by proponents may affect the independence of that scientific work.⁹⁶

3.81 For example, AIMS noted that developers are often required to commission work and provide the results of that work to decision-making authorities such as GBRMPA. AIMS observed that:

While this mechanism allows for adequate resourcing of that scientific work, it does not guarantee independence. There is a clear potential for conflicts of interest since the oversight and quality control of the work is carried out by the developer, whose interests in controlling development costs could conflict with the [Great Barrier Reef Marine Park] Authority's interests in minimising environmental and social impacts.⁹⁷

3.82 AIMS suggested that:

A more effective mechanism to ensure independence, which has been successfully applied by GBRMPA in the past, would be for the Authority, or some other independent agency, to commission and oversee the work, while still requiring the developer to pay the costs.⁹⁸

3.83 In contrast, industry groups such as Ports Australia told the committee that 'Queensland Ports undertake rigorous and transparent environmental assessment for all major projects undertaken'.⁹⁹

3.84 At the same time, many submitters and witnesses were also concerned that the science of the reef is becoming politicised.¹⁰⁰ For example, Ms Wishart of AMCS expressed concern that, in the case of the Abbot Point dredging and dumping approvals (as discussed further in Chapter 6), 'we saw politics overriding science'.¹⁰¹

96 See, for example, WWF-Australia and AMCS, *Submission 23*, p. 12; Whitsunday Charter Boat Industry Association, *Submission 46*, p. 9; Arabon Seafoods, *Submission 44*, p. 2; Ms Wendy Tubman, Coordinator, NQCC, *Committee Hansard*, 23 July 2014, p. 1; Ms Suzanne Arnold, Coordinator, Australians for Animals, *Committee Hansard*, 23 July 2014, p. 48.

97 AIMS, *Submission 36*, p. 3; see also Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 20.

98 AIMS, *Submission 36*, p. 3; see also Dr Jamie Oliver, Research Director, AIMS, *Committee Hansard*, 23 July 2014, p. 20.

99 Mr David Anderson, Chief Executive Officer, *Ports Australia*, 21 July 2014, p. 22.

100 See, for example, AgForce, *Submission 14*, p. 17; NQCC, *Submission 30*, p. 4; Whitsunday Charter Boat Industry Association, *Submission 46*, p. 9; Ms Wendy Tubman, Coordinator, NQCC, *Committee Hansard*, 23 July 2014, p. 1.

101 Ms Felicity Wishart, Great Barrier Reef Campaign Director, Australian Marine Conservation Society, *Committee Hansard*, 21 July 2014, p. 20.

3.85 Professor Pandolfi of the Australian Coral Reef Society similarly expressed concern about 'the role of science and the uptake of that science by government in meeting its obligations and its stated concerns over the reef'.¹⁰²

3.86 The Whitsunday Charter Boat Industry Association submitted that research to fill gaps in scientific knowledge 'must be independently done and peer reviewed. So the process becomes more about the process rather than a political football'.¹⁰³

3.87 In the context of shipping (discussed further elsewhere in this report), Mr Geoff McPherson, a marine acoustic specialist, told the committee that the available scientific information on the impacts of underwater noise pollution is not being utilised.¹⁰⁴ He suggested that one possible explanation for this might be 'to marginalise any perceived threat to unfettered shipping transit through the Great Barrier Reef'.¹⁰⁵

3.88 Industry groups expressed concerns that claims are being made, and particularly about the impacts of port developments and shipping on the reef, which are not supported by sufficient scientific evidence.¹⁰⁶ For example, Ports Australia submitted that there is a lot of 'uninformed rhetoric about the impact of port developments in the broader [Great Barrier Reef] which, among other things, is not based on good scientific evidence or objective analysis'.¹⁰⁷ Mr Chris McCombe of the Minerals Council agreed that:

...many of the claims about the scale and impact of development on the Great Barrier Reef are not science based or are founded on wildly incorrect assumptions.¹⁰⁸

Consistency of decision-making with the precautionary principle

3.89 Another issue raised during the committee's inquiry was whether government decision processes impacting the reef are consistent with the precautionary principle.

3.90 Section 3A of the EPBC Act sets out the principles of ecologically sustainable development and encapsulates the precautionary principle at paragraph (b):

If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

102 Professor John Pandolfi, Councillor and Past President, Australian Coral Reef Society, *Committee Hansard*, 21 July 2014, p. 2.

103 Whitsunday Charter Boat Industry Association, *Submission 46*, p. 9.

104 Mr Geoff McPherson, *Committee Hansard*, 23 July 2014, p. 42.

105 Mr Geoff McPherson, *Committee Hansard*, 23 July 2014, p. 41.

106 See, for example, Queensland Ports Association, *Submission 13*, p. 15; Queensland Resources Council, *Submission 28*, pp 12–14; Mr Michael Roche, Chief Executive, Queensland Resources Council, *Committee Hansard*, 21 July 2014, p. 30.

107 Ports Australia, *Submission 11*, p. 2.

108 Mr Chris McCombe, Assistant Director, Environmental Policy, Minerals Council of Australia, *Committee Hansard*, 21 July 2014, p. 31.

3.91 The precautionary principle is defined in the same way in section 3 of the GBRMP Act. Subsection 7A(3) of the GBRMP Act then provides that, in managing the Marine Park and in performing its other functions, GBRMPA must have regard to (amongst other matters) the principles of ecologically sustainable use, which includes the precautionary principle.¹⁰⁹

3.92 Some submitters and witnesses suggested that government decision-making processes are consistent with the precautionary principle. For example, Shipping Australia submitted that the strict conditions imposed on recent dredging projects, including the Abbot Point projects, 'support our assessment that the government decision processes are consistent with the precautionary principle'.¹¹⁰ Ports Australia submitted that 'all of the ports located in the [Great Barrier Reef] region continue to apply a high precautionary approach with new development proposals'.¹¹¹

3.93 Queensland Ports Association agreed that:

Where the science indicates impacts or uncertainty then appropriate avoidance, mitigation, monitoring and precaution are warranted.¹¹²

3.94 In contrast, others expressed doubt as to whether recent government decision-making concerning the reef has been consistent with the precautionary principle.¹¹³ A particular example cited was the Abbot Point decision, where it was suggested that there is considerable uncertainty about the impacts of dumping of dredge spoil and that a more precautionary approach should have been taken (this is discussed further in Chapters 5 and 6).¹¹⁴ However, in response to questioning on this issue, the Department of the Environment advised that:

The precautionary principle has been taken into account in making decisions of approval on dredging proposals under the *Environment Protection and Biodiversity Conservation 1999*. This is a legal requirement under section 391 of the Act.¹¹⁵

3.95 Others suggested, with concern, that activities and developments are being approved with conditions requiring further research to discover the impacts of those

109 GBRMP Act, ss 7A(3)(b), s. 3AB and s. 3.

110 Shipping Australia, *Submission 3*, p. 5.

111 Ports Australia, *Submission 11*, p. 2.

112 Queensland Ports Association, *Submission 13*, p. 15.

113 See, for example, Australian Coral Reef Society, *Submission 8*, p. 3; Carefish, *Submission 16*, p. 3; CAFNEC, *Submission 19*, p. 9; Wildlife Preservation Society of Queensland, *Submission 33*, p. 3; Association of Marine Park Tourism Operators Pty Ltd (AMPTO), *Submission 41*, p. 3; Save the Reef, *Submission 50*, p. 11; Ms Margaret Moorhouse, Spokesperson, Alliance to Save Hinchinbrook, *Committee Hansard*, 23 July 2014, p. 11; Mr Colin McKenzie, Executive Director, Association of Marine Park Tourism Operators, *Committee Hansard*, 23 July 2014, p. 36.

114 See, for example, CAFNEC, *Submission 19*, p. 7; NQCC, *Submission 30*, p. 4; Whitsunday Residents Against Dumping, *Submission 39*, pp 3–4.

115 Department of the Environment, *Answers to written questions on notice of 1 August 2014*, p. 4.

activities and developments. It was suggested that this was inappropriate and not consistent with the precautionary principle.¹¹⁶

3.96 Professor Hoegh-Guldberg submitted that application of the precautionary principle in decision-making in relation to the Great Barrier Reef is variable. He suggested that the Great Barrier Reef Marine Park rezoning process 'has been exemplary and the resulting Marine Protected Area (MPA) is consistent with the precautionary principle'. In contrast, Professor Hoegh-Guldberg was concerned that 'smaller scale decision-making and development approvals appear to follow this principle to a lesser extent'. By way of example, he suggested that:

...recent port development approvals and offset strategies build on the assumption that the impact of dredging and seagrass and reef habitats is quantifiable when this is not consistent with the precautionary principle – where in this case we are assuming high potential impacts when there is high uncertainty with impact predictions...¹¹⁷

3.97 WWF-Australia and Australian Marine Conservation Society were concerned as to whether the precautionary principle will continue to be applied if Commonwealth approval powers are delegated to Queensland under the one-stop shop proposal (which is discussed further in Chapter 8).¹¹⁸

116 See, for example, NQCC, *Submission 30*, p. 4; Ms Ellen Roberts, Coordinator, Mackay Conservation Group, *Committee Hansard*, 22 July 2014, p. 15.

117 Professor Hoegh-Guldberg, *Submission 6*, p. 5.

118 WWF-Australia and AMCS, *Submission 23*, p. 13.