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WORLD HERITAGE AND CLIMATE CHANGE:

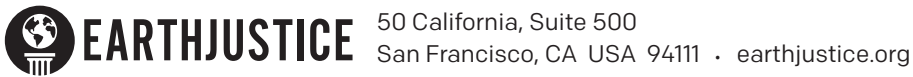
The Legal Responsibility of States
to Reduce Their Contributions to Climate Change

A Great Barrier Reef Case Study



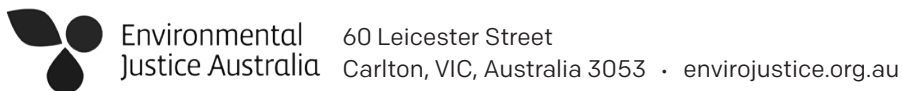
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Front Cover: Coral Bleaching at Heron Island, Great Barrier Reef. *XL Catlin Seaview Survey / Richard Vevers*
Back Cover: Heart Reef from above, Great Barrier Reef, Australia. *Shutterstock / ronnybas*

SUMMARY

In 2017, the World Heritage Committee has an opportunity and a responsibility to protect World Heritage-listed coral reefs, including the Great Barrier Reef World Heritage Area, from the devastating effects of climate change. This report provides a framework for the Committee's assessment of the international legal obligations of countries where climate-affected World Heritage properties are located. Applying the framework to Australia, the report concludes that Australia is failing to fulfill its obligation under the World Heritage Convention to protect the Great Barrier Reef from the impacts of climate change.

Coral reefs are one of the most remarkable and biologically diverse elements of Earth's natural heritage, supporting more species per square meter than any other marine environment. Reefs provide spawning, breeding, nursery, and feeding grounds for key elements of the ocean ecosystem, and economic and environmental services to millions of people. Corals are fundamental to Australia's Great Barrier Reef and many other World Heritage sites.

Unfortunately, corals around the world are bleaching and dying because of ocean warming and acidification caused by out-of-control greenhouse gas emissions. The plight of these corals – and of the World Heritage sites on which they depend – is growing more dire every year. Without strong global action to reduce greenhouse gas emissions, many may not survive beyond the middle of this century.

In the past few years, the effect of climate change on corals has been made frighteningly evident. Elevated ocean temperatures have triggered wide-scale coral bleaching events around the world, from the United States' Papahānaumokuākea Marine National Monument, to France's Lagoons of New Caledonia, the Seychelles' Aldabra Atoll, and Kiribati's Phoenix Islands Protected Area. On Australia's Great Barrier Reef, a staggering 22% of corals died in 2016 – the worst coral die-off in recorded history. In the northern third of the Reef, an area that had previously been relatively unaffected due to its distance from other human pressures, approximately two-thirds of the shallow-water coral died in just eight to nine months. On some reefs in the north, almost all the coral died.



Decomposing soft coral falling off the reef, May 2016.
XL Catlin Seaview Survey / Richard Vevers

Scientists tell us that even under the most ambitious current reduction scenarios for greenhouse gas emissions, 70% of corals worldwide are projected to suffer from long-term degradation by 2030, and, accordingly, limiting warming to 1.5°C or less is essential for the survival of coral reefs and many other marine ecosystems. To minimize the impacts of climate change on World Heritage-listed coral reefs and limit global average temperature rise to well below 2°C – the goal the parties to the United Nations Framework Convention on Climate Change adopted in the Paris Agreement of 2015 – humanity must immediately and substantially reduce greenhouse gas emissions. This means taking immediate steps to reduce the burning of fossil fuels, the largest source of greenhouse gases.

Under the World Heritage Convention, Australia has primary responsibility for protecting and conserving the Great Barrier Reef, and it must address both existing and potential threats to the Reef, whatever their source. The Convention requires Australia to “do all it can ... to the utmost of its own resources” to take “appropriate” action to protect and conserve the Reef. This obligation reflects the international legal principle of common but differentiated responsibilities, which is a way of determining a nation’s “fair share” of responsibility for solving an environmental problem by taking into account differences in states’ contribution to particular environmental problems, and their economic and technical capacity to address them.



Aerial view of the Great Barrier Reef.
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Like all nations with World Heritage-listed coral reefs, Australia’s fair share to protect the Great Barrier Reef begins with action to increase the Reef’s resilience by minimizing non-climate stressors. For small-island states and other states with minimal greenhouse gas emissions or fossil fuel developments, the duty may end there, and may even be conditioned upon the receipt of technical and/or financial assistance from wealthier nations and/or those responsible for more emissions. But for Australia, the obligation to do “all it can ... to the utmost of its resources” requires more. In light of Australia’s resources, capacity to act, and very high per-capita greenhouse gas emissions, Australia must take serious and effective action to reduce its current greenhouse gas emissions and to cease the construction of new fossil fuel extraction infrastructure that will lock in decades of greenhouse gas emissions.

Unfortunately, Australia is failing to meet these obligations. It is not doing its fair share to reduce its greenhouse gas emissions, especially as evidence indicates that Australia is unlikely to meet its commitments under the Paris Agreement, and it is permitting the development of massive new coal mines that will contribute substantially to climate change and the further deterioration of the Great Barrier Reef. Also, Australia’s Reef 2050 Plan – its framework for managing the Reef until 2050 – relies on inadequate government policy to address Australia’s contribution to climate change and is silent on the impacts of emissions from the new fossil fuel extraction projects in Australia. Finally, Australia is failing to adequately reduce non-climate stressors on the Reef: among other things, it has permitted the expansion of the coal export port at Abbot Point, within and adjacent to the World Heritage Area, which will contribute to the cumulative deterioration of the Reef.

In light of extreme vulnerability of the Great Barrier Reef World Heritage Area to the impacts of climate, and because the World Heritage Committee’s Advisory Bodies are currently considering Australia’s implementation of the Reef 2050 Plan, we recommend that at its 41st session in July 2017, the World Heritage Committee should:

1. **Express its deep concern about coral bleaching and mortality in the Great Barrier Reef World Heritage Area, and about the threat that climate change poses to the health and survival of the Great Barrier Reef ecosystem;**
2. **Call on Australia not to approve or support any new development projects that will directly, indirectly, or cumulatively harm the Great Barrier Reef World Heritage Area, including by contributing to climate change;**
3. **Request Australia to invite a monitoring mission as soon as possible to review Australia's response to the coral bleaching crisis and the effectiveness, implementation, and funding of the Reef 2050 Long-Term Sustainability Plan, and to consider the state of conservation of the property as a whole;**
4. **Require Australia to report annually on its progress in implementing the Reef 2050 Plan and its response to the coral bleaching crisis, including on the substantive near-term steps it is taking to immediately address the threat of climate change to the Great Barrier Reef World Heritage Area;**
5. **Call on Australia to ensure that it meets its commitments under the Paris Agreement and does its fair share to reduce its greenhouse gas emissions;**
6. **Inscribe the Great Barrier Reef World Heritage Area on the List of World Heritage in Danger; and**
7. **Call on financiers not to support or fund development projects that will directly, indirectly, or cumulatively harm the Great Barrier Reef World Heritage Area.**

In addition, **the Committee should perform the same analysis of the obligations of other states with World Heritage-listed coral reefs**, keeping in mind that small-island states and other states with minimal greenhouse gas emissions or fossil fuel developments may have no duty beyond taking appropriate action to reduce non-climate reef stressors, possibly conditioned upon the receipt of technical and/or financial assistance from wealthier nations and/or those responsible for more emissions.

1. CLIMATE CHANGE, GLOBAL CORAL BLEACHING, AND THE DETERIORATION OF THE GREAT BARRIER REEF WORLD HERITAGE AREA

“In 2015 and 2016, the hottest years on record, we have witnessed at first hand the threat posed by human-caused climate change to the world’s coral reefs.”¹

1.1 Climate change threatens coral reefs around the world

Coral reefs are one of the most remarkable and biologically diverse elements of Earth’s natural heritage, supporting more species per square meter than any other marine environment.² Reefs provide spawning, breeding, nursery, and feeding grounds for key elements of the ocean ecosystem, and economic and environmental services to millions of people.³ Unfortunately, these unique ecosystems may not survive beyond the middle of this century.⁴

Although numerous human activities contribute to the deterioration of coral reefs, including coastal development, pollution, and overfishing,⁵ the single biggest threat to the health and survival of coral reefs is climate change, particularly in the form of warming waters and ocean acidification.⁶ Rising sea temperatures lead to “an increased risk of mass coral bleaching; gradual ocean acidification will increasingly restrict coral growth and survival; and there are likely to be more intense weather events,” which hasten the physical deterioration of reefs.⁷

The threat of climate change was made real in recent years when warming ocean temperatures caused by climate change triggered wide-scale coral bleaching around the world.⁸ From Papahānaumokuākea (United States of America) to the Phoenix Islands Protected Area (Kiribati), to the Aldabra Atoll (Seychelles), the Lagoons of New Caledonia (France), and the Great Barrier Reef (Australia), World Heritage-listed coral reefs have suffered bleaching⁹ – a process in which heat stress starves corals by destroying their symbiotic relationship with the microscopic algae that produce their food.¹⁰ Unfortunately, bleaching events are likely to become more frequent and devastating as seas continue to warm because of climate change.¹¹



Fluorescing and bleaching corals in New Caledonia, March 2016.
XL Catlin Seaview Survey / Richard Vevers.

Even under “the most ambitious current reduction scenarios for global greenhouse gas emissions, 70 per cent of corals worldwide are projected to suffer from long-term degradation by 2030, putting the reefs protected in many World Heritage properties at significant risk.”¹² Indeed, scientists have recently projected that by mid-century, 99% of the world’s coral reefs will experience annual bleaching severe enough to change the reef and limit coral recovery,¹³ with most corals worldwide likely to be dead in as little as 30 to 40 years if humans continue to burn fossil fuels at current rates.¹⁴ Indeed, scientists tell us that limiting warming to 1.5°C or less is essential for the survival of coral reefs and many other marine ecosystems.¹⁵

1.2 The deterioration of the Great Barrier Reef: a site in danger

**“The overall Outlook for the Great Barrier Reef World Heritage Area is poor.”
- World Heritage Committee¹⁶**

**After the 2016 bleaching event, “the hard corals were dead and covered in algae, looking like they’ve been dead for years. The soft corals were still dying and the flesh of the animals was decomposing and dripping off the reef structure.”
- Richard Vevers, Chief Executive of the Ocean Agency¹⁷**

The Great Barrier Reef World Heritage Area is one of the “jewels in the World Heritage crown,”¹⁸ a “globally outstanding and significant entity ... of enormous scientific and intrinsic importance ... [and] superlative natural beauty above and below the water.”¹⁹ Stretching 2,300 kilometers, it contains 3,000 individual reefs and 1,050 islands and encompasses a globally unique array of ecological communities and habitats that are home to thousands of plant and animal species, including the iconic dugong, six of the world’s seven species of marine turtle, over 30 species of whale and dolphin, around 600 coral species, over 1,600 fish species, 125 bird species, and 133 species of sharks and rays.²⁰



Manta Rays, Lady Elliot Island, Great Barrier Reef.
XL Catlin Seaview Survey / Underwater Earth.

**“The twin perils brought by climate change – an increase in the temperature of the ocean and in its acidity – threaten [the Great Barrier Reef’s] very existence.”
- David Attenborough²¹**

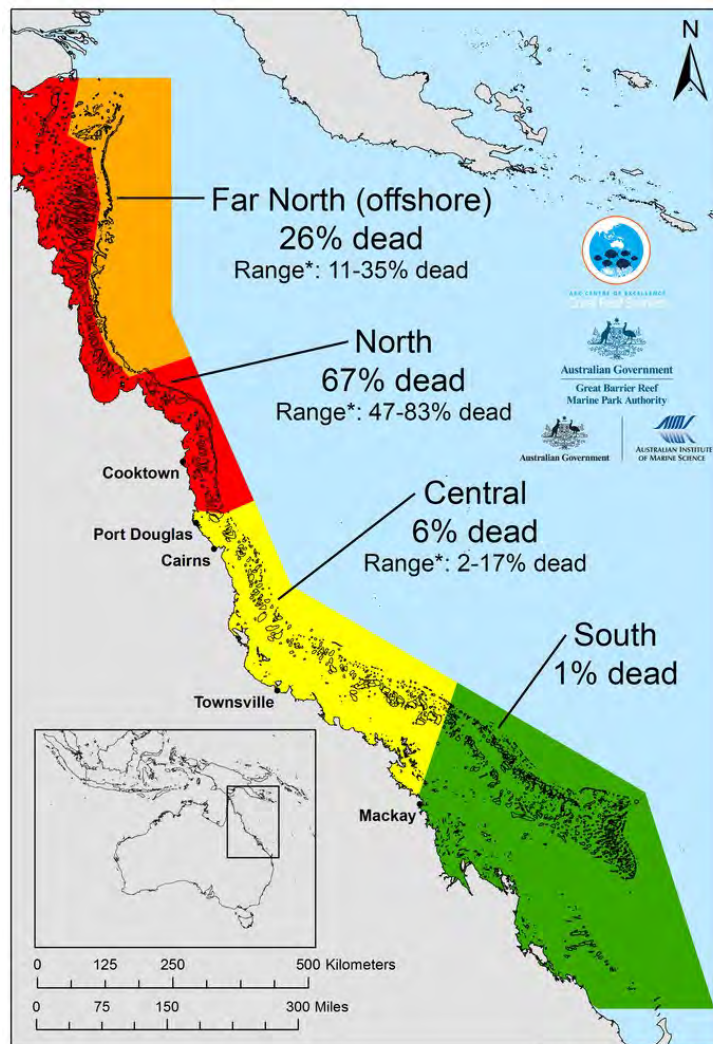
Like other reefs around the world, this global treasure is under threat. An accumulation of decades of harm caused by human activities such as coastal development (including port development, dredging, and dumping of dredge spoil) and water pollution have deteriorated the Great Barrier Reef²² to the point that it meets five of the eight criteria, and likely meets a sixth criterion, for inscription on the List of World Heritage in Danger.²³ A property need only meet one criterion to be inscribed on this list.²⁴ (Appendix 1 to this report includes a summary of a legal assessment by Earthjustice and Environmental Justice Australia of the Great Barrier Reef World Heritage Area against the criteria for inscription on the List of World Heritage in Danger.²⁵) In the last 40 years, over half the coral cover has disappeared, populations of species that contribute to the outstanding universal value that the World Heritage Area was established to protect – such as dugongs and dolphins – have decreased alarmingly, and vital habitats like seagrass meadows have been significantly degraded.²⁶

Although these non-climate threats are significant, the Government of Australia has recognized that, like other reefs, “[c]limate 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.”²⁷ Moreover, corals weakened by non-climate stressors are more susceptible to the effects of climate change, and *vice-versa*.²⁸

The significance of the climate threat to the Great Barrier Reef was highlighted last year, when **record-breaking sea temperatures triggered coral bleaching on 93% of the thousands of individual reefs**

that comprise the Great Barrier Reef.²⁹ **Twenty-two percent of the coral in the Reef died in the worst coral die-off in recorded history.**³⁰ Although the elevated temperatures were amplified by a strong El Niño,³¹ scientists estimate that they were made 175 times more likely by climate change.³² This event has “substantially diminished” the Reef’s outstanding universal value.³³

Most coral deaths occurred in the northern third of the Reef, where **approximately two-thirds of the shallow-water corals died in just eight to nine months.**³⁴ **On some of the reefs in the north, nearly all the corals died.**³⁵ **In one-quarter of worst-affected reefs in the north, coral losses ranged from 83-99%.**³⁶ This is particularly devastating because the corals in the northern Reef had previously been relatively unaffected due to their distance from other human pressures, unlike the central and southern reefs that have long been under pressure from human activities.³⁷ Fortunately, the central and southern thirds of the Reef escaped with relatively minor damage, with a mortality rate of about six percent of the coral in the central third and about one percent in the southern third, although about 75% of those reefs suffered bleaching.³⁸



Extent and severity of coral mortality, November 29, 2016.
 ARC Centre of Excellence for Coral Reef Studies³⁹

Unfortunately, as of February 2017, water temperatures in the Reef are about 0.9-2°C above the long-term average for this time of year,⁴⁰ newly bleached corals were recently discovered near Palm Island in the central Reef,⁴¹ and most the Reef has been placed on alert for coral bleaching by the US National Oceanic and Atmospheric Administration.⁴²

Corals that were bleached but have survived are also likely to suffer from higher levels of disease, slower growth rates, and lower reproduction rates,⁴³ and scientists expect it will take at least 10 to 15 years for the corals in the northern region to recover from the 2016 bleaching event, provided that conditions such as water quality are conducive to recovery.⁴⁴ Any future bleaching events – which are likely to become more frequent as seas warm with climate change – would interrupt the recovery.⁴⁵ Indeed, at present rates of climate change, bleaching like that experienced in the Great Barrier Reef in 2016 could occur every two years by the 2030s.⁴⁶

“As a marine ecologist who has been working on the Great Barrier Reef for 30 years I am today still stunned, often tearful, and ashamed to look my children in the eye. The Great Barrier Reef is undergoing change that means it will never be the same again in my lifetime.”

- Professor Justin Marshall⁴⁷

Even before the 2016 bleaching, the World Heritage Committee and Australia had both recognized that the Reef was under threat. In 2014, Australia’s Great Barrier Reef Marine Park Authority⁴⁸ reported that the long-term outlook for the Reef was **poor, deteriorated, and deteriorating.**⁴⁹ In 2015, the World Heritage Committee noted its concern that the **“overall Outlook for the property is poor,”**⁵⁰ and Australia reported that **25 of the 41 key values for the Reef is listed as a World Heritage property are deteriorating.**⁵¹ Indeed, eight of the 11 values that contribute to the Reef’s outstanding universal value as habitat for conserving biodiversity are deteriorating.⁵² This situation was made substantially worse by the 2016 bleaching and die-off, which threatens the entire reef ecosystem – including fish, invertebrates, and predators such as sea turtles, dolphins, and sharks, all of which rely on live, healthy coral.⁵³

2. THE WORLD HERITAGE CONVENTION REQUIRES STATES PARTY TO TAKE ALL ACTIONS WITHIN THEIR RESPECTIVE CAPABILITIES TO PROTECT WORLD HERITAGE PROPERTIES WITHIN THEIR TERRITORY FROM ANY THREATS

2.1 States party to the World Heritage Convention have a duty to protect World Heritage properties within their territory

In the World Heritage Convention, the global community of nations has recognized that some places have “significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity.”⁵⁴ These places of “outstanding universal value”⁵⁵ are “part of the world heritage of mankind as a whole”⁵⁶ and must be preserved as such, as their “deterioration or disappearance ... constitutes a harmful impoverishment of the heritage of all nations of the world.”⁵⁷ To prevent such impoverishment, the Convention recognizes the “duty of the international community as a whole to co-operate” to protect places of outstanding universal value.⁵⁸

However, the Convention does not leave the protection of world heritage to the international community alone. Instead, the Convention places the primary responsibility for protecting and conserving each World Heritage property on the state where that property is situated,⁵⁹ and requires each state to “do all it can ... to the utmost of its own resources” to protect and conserve its World Heritage properties.⁶⁰ States must protect and manage those properties to ensure that their outstanding universal value, including their integrity,⁶¹ is “sustained or enhanced over time.”⁶² Each state is thus custodian of its World Heritage properties, which it holds in trust for all humankind.



World Heritage site symbol in Bath, England.
<http://meandmysansar.blogspot.com>

Protecting and conserving a World Heritage property logically includes addressing both existing and potential threats, a conclusion supported by the criteria for inscription on the List of World Heritage in Danger, which include threats from an “ascertained danger” or a “potential danger.”⁶³ The Convention places no limits or exclusions on the kinds of threats states must address. As the World Heritage Centre has noted, “Where the threat [to a property] comes from is irrelevant.”⁶⁴

2.2 When climate change affects a World Heritage property, the state on whose territory the site is situated has a duty to take action appropriate to that state’s respective national responsibilities and capabilities to reduce its contribution to climate change

As discussed above, climate change is the most serious long-term threat to World Heritage-listed coral reefs. To minimize the impacts of climate change on these properties and limit global average temperature rise to well below 2°C – the goal the parties to the United Nations Framework Convention on Climate Change (“UNFCCC”) adopted in the Paris Agreement of 2015⁶⁵ – humanity must immediately and substantially reduce greenhouse gas emissions. This means taking immediate steps to reduce the burning of fossil fuels, the largest source of greenhouse gases,⁶⁶ as quickly as possible.⁶⁷ In both the World Heritage Convention and the UNFCCC, the global community has agreed that the action a nation is obligated to take to address climate change depends on that nation’s responsibility for climate change and its capacity to act.

To fulfill its obligation under the World Heritage Convention to do “all it can ... to the utmost of its own resources”⁶⁸ to protect and conserve its own World Heritage properties, a state must take all “necessary” legal, scientific, and financial measures “as appropriate for each country.”⁶⁹ The recognition that a state’s obligations depend on what is “appropriate for each country” and what is within “its own resources” reflects the international legal principle of common but differentiated responsibility. This principle, which evolved from the concept that the environment is the common heritage of humankind, recognizes differences in both the contributions of states to environmental problems, and their economic and technical capacity to address these problems.⁷⁰ It is a way of determining each nation’s “fair share” of responsibility for solving an environmental problem. In the words of the Rio Declaration on Environment and Development,

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth’s ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.⁷¹

Accordingly, a state’s fair share – which is the “appropriate” actions that constitute its “utmost” effort to protect a world heritage site – depends on both that state’s contribution to the threats facing the property and its resources and capability to address those threats and otherwise protect the site.

The UNFCCC uses a similar approach, requiring parties to protect the climate system “on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.”⁷² The countries with the greatest historical and current emissions, and the greatest financial and technological capacity to act, must therefore take the lead in addressing climate change and its effects.

Because World Heritage-listed coral reefs are severely threatened by climate change, these principles must guide the assessment of national obligations to protect such reefs: each nation with a listed reef must do all it can, within its capacity and taking into account its contribution to climate change, to protect its reefs from the impacts of climate change. As the World Heritage Centre has recognized, the obligation of States to protect their own World Heritage properties is the “basis for States to ensure that they are doing all that they can to address the causes and impacts of climate change.”⁷³



Coral bleaching, March 2016 (left), and dead coral, May 2016 (right), Lizard Island, Great Barrier Reef. XL Catlin Seaview Survey / Richard Vevers

Specifically, this means that all states with World Heritage-listed coral reefs have a duty to do their fair share by taking appropriate action to increase the resilience of those reefs by minimizing non-climate stressors such as infrastructure development, overfishing, or pollution.⁷⁴ For small-island and other states with minimal greenhouse gas emissions or fossil fuel developments, this may be the only duty, and it may be conditioned upon the receipt of technical and/or financial assistance from wealthier nations and those responsible for more emissions.

However, states with substantial historical or current greenhouse gas emissions and more financial and technical capacity also need to do their fair share by taking serious and effective action to reduce their own existing emissions. At a minimum, this would require states to meet their agreed emissions reduction targets under the Paris Agreement, although states should do more because analysis indicates that these commitments are inadequate to limit global temperature rise to 2°C.⁷⁵ This obligation to mitigate emissions to prevent harm to a state's own climate-threatened World Heritage-listed sites is supported by the Convention's admonition against taking "any deliberate measures which might damage directly or indirectly" properties situated in other states."⁷⁶

But it is not enough to reduce the burning of fossil fuels. It is also essential to avoid the lock-in of future emissions that would carry the world far past 2°C, by stopping the construction of new fossil fuel extraction infrastructure as quickly as possible.⁷⁷ Once such infrastructure is built, it becomes difficult to avoid using it through its full economic lifetime, locking in a "carbon legacy."⁷⁸ As the International Energy Agency has said,

Potential CO2 emissions are stored not only underground in the form of coal, oil and natural gas, but are also implicit in the nature of existing infrastructure. Emissions that will come from the normal use of infrastructure currently in place and under construction are locked-in for many years, as the average lifetime of energy infrastructure is long.... Barring dramatic shifts in relative fuel prices and technological breakthroughs, emissions from existing infrastructure cannot be avoided without decisive policy action that entails premature retirements, costly refurbishments or leaving capacity idle.⁷⁹

The United Nations Environment Programme has also noted concerns about the lock-in of future emissions, noting that delaying emissions reductions "will result in greater lock-in of carbon- and energy-intensive infrastructure in the energy system and society, as a whole. It will also be a disincentive for near-term learning and technology development that will be essential in the long-term."⁸⁰

New extraction infrastructure also affects the mix of resources used to generate electricity and the concomitant greenhouse gas emissions.⁸¹ Economists and other experts tell us that the development of new fossil fuel extraction infrastructure is likely to result in increased coal consumption (and therefore emissions) because an increase in the supply of coal is likely to reduce the price of coal and, therefore, increase consumption.⁸²

In addition, the reserves in already-operating oil and gas fields and coal mines contain enough carbon by themselves to take us well beyond 2°C.⁸³ More importantly, scientific research suggests that, in order to limit warming to 2°C, most currently identified and recoverable global fossil fuel reserves should remain unburned from 2010 to 2050, including over 80% of coal reserves, half of gas reserves, and one-third of oil reserves.⁸⁴ Notably in relation to Australia, scientists and other experts have estimated that over 90% of Australia's known coal reserves must remain unburned.⁸⁵

For all these reasons, states responsible for substantial historical or current greenhouse gas emissions and/or with financial and technical capacity have an obligation not to authorize or facilitate new fossil fuel extraction when their World Heritage sites are threatened by climate change.

This obligation is reinforced by the World Heritage Committee's request that states make every effort to ensure that extractive activities in their territory do not damage world heritage, no matter where they are located,⁸⁶ and that extractive industries ensure that "existing and future operations in areas surrounding World Heritage properties [be] compatible with the protection of their Outstanding Universal Value and do

not threaten their integrity,”⁸⁷ which reflects a recognition that states are responsible for preventing harms from activities outside the boundaries of the properties. As the International Union for Conservation of Nature has stated, extractive projects outside World Heritage properties “should not, under any circumstances, have negative impacts” on the outstanding universal value of the properties.⁸⁸ To prevent negative impacts, such projects must be “subject to an appropriate and rigorous appraisal process” prior to the grant of licenses.⁸⁹ The appraisal should specifically assess the likely effects of the development proposal on the outstanding universal value of the property, including “direct, indirect and cumulative effects.”⁹⁰ For example, in 2013, the Committee requested Australia ensure that the strategic assessment of the Great Barrier Reef World Heritage Area that Australia was preparing at the time “fully address direct, indirect and cumulative impacts” on the Reef.⁹¹



Alpha Coal Mine test pit, Queensland, Australia.
Greenpeace / Andrew Quilty

The obligation of states not to authorize or facilitate new fossil fuel extraction when their World Heritage sites are threatened by climate change is also reinforced by the sustainable development policy adopted by the Committee in 2015.⁹² This policy, which notes that sustainability is a fundamental principle for all aspects of development, requires states to adopt a long-term perspective in decision-making in relation to World Heritage properties and to avoid, and, if avoidance is not possible, to mitigate, all negative impacts on the environment.⁹³

Accordingly, states with World Heritage-listed coral reefs have a duty to do their fair share to protect those properties by taking appropriate action to increase the resilience of those reefs by minimizing non-climate stresses. Those states responsible for substantial historical or current greenhouse gas emissions and with more financial and technical capacity also need to do their fair share to reduce their own existing emissions, and ensure they do not authorize or facilitate the development of new sources of emissions or new fossil fuel extraction infrastructure.

3. AUSTRALIA IS FAILING TO FULFILL ITS RESPONSIBILITY TO PROTECT THE GREAT BARRIER REEF WORLD HERITAGE AREA FROM THE IMPACTS OF CLIMATE CHANGE

As described in the preceding sections, Australia has a legal obligation to do “all it can ... to the utmost of its own resources” to protect the Great Barrier Reef World Heritage Area from all types of threats to the Reef’s outstanding universal value, including climate change. Australia is a relatively well-resourced country with high per-capita emissions, and this obligation thus requires it to take all actions within its resources and capabilities, taking into account its contribution to the problems. In other words, Australia must take serious and effective action to reduce its existing greenhouse gas emissions and not to facilitate new fossil fuel infrastructure, and it must adequately reduce non-climate stressors.

Despite this obligation and the critical vulnerability of the Reef to climate change, Australia is failing to meet its obligations to protect the Reef.



Coral bleaching, March 2016 (top), and dead coral, May 2016 (bottom), Lizard Island, Great Barrier Reef.
XL Catlin Seaview Survey / Richard Vevers

3.1 Australia is failing to do its fair share to reduce its greenhouse gas emissions and to not facilitate new fossil fuel extraction infrastructure that will contribute to the further deterioration of the Great Barrier Reef

“Unless we wake up and deal with climate change sincerely and deeply then we really will have a Great Barrier Reef not worth visiting.”

- Professor Ove Hoegh-Guldberg⁹⁴

Australia has failed in all respects to do its fair share to reduce the greenhouse gas emissions that threaten to destroy the Great Barrier Reef World Heritage Area. Despite being among the highest per capita greenhouse gas emitters, having made a commitment to reduce emissions under the Paris Agreement, and having substantial capacity to act, the target Australia has set for reducing its current greenhouse gas emissions is not ambitious enough, and, in any event, it is unlikely to meet that target. Even worse, it is in the process of authorizing the mining of coal that will be burned in power plants, locking in decades of emissions that will contribute to climate change and the deterioration of the Reef.

3.1.1 Australia is failing to do its fair share to reduce its existing greenhouse gas emissions

Australia is among the highest per capita emitters of greenhouse gases.⁹⁵ As a signatory to the Paris Agreement, Australia has agreed to the global goal of limiting global warming to well below 2°C above pre-industrial levels, and pursuing efforts to limit warming to 1.5°C.⁹⁶ Under the Agreement, each country must submit successive nationally determined contributions (“NDCs”) to “reflect its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in light of the different national circumstances.”⁹⁷ In its NDC submitted in August 2015, Australia committed to reduce its greenhouse gas emissions by 26% to 28% below 2005 levels by 2030.⁹⁸ Unfortunately, it appears unlikely that Australia will meet its NDC.

Australia has recognized that it must “do [its] share” to reduce greenhouse gas emissions to protect the Great Barrier Reef.⁹⁹ The Great Barrier Reef Marine Park Authority has also stated that the severity of last year’s coral bleaching “reinforces the need for strong global action on climate change.”¹⁰⁰ Nevertheless, in December 2016, the government’s Chief Scientist stated that the current policy settings for the electricity sector – the largest source of emissions in Australia – “do not provide a clear pathway to the level of reduction required to meet” Australia’s NDC.¹⁰¹ A recent report of the Australian government also indicates that Australia’s emissions are projected to grow from now until 2030,¹⁰² and that by 2030 the country will need to reduce its cumulative emissions by around 1000 MtCO_{2e} to achieve its 2030 target.¹⁰³ An assessment of Australia’s targets and policies by Climate Analytics and research organizations in August 2015 also found that Australia’s climate policies fall far short of the emissions reductions required to achieve its NDC.¹⁰⁴

Even if Australia were to meet its NDC, however, scientists and other experts have criticized Australia’s NDC as “not consistent with its commitment to play an equitable role in holding the global temperature rise to 2°C, let alone 1.5°C.”¹⁰⁵ In 2015, Australia’s Climate Change Authority (an independent advisory body to the government) recommended that Australia’s emissions reduction target for 2030 be 45% to 65% below 2005 levels (with the range to provide flexibility in the medium-term).¹⁰⁶ The Authority considered a 45% reduction would be an appropriate contribution to limiting warming to no more than 3°C or a 50% chance of less than 2°C, and a 65% reduction would be an appropriate contribution to limiting warming to no more than 1.5°C or a 75% chance of less than 2°C.¹⁰⁷ The Authority also considered such a target to be consistent with global analysis of fair share reduction efforts,¹⁰⁸ and members of the Authority have noted that, under Australia’s current target, it will have used 90% of the budget that the Authority recommends to 2050.¹⁰⁹

In addition, Paris Equity Check, which uses peer-reviewed methodology¹¹⁰ to assess the equity of countries' NDCs against five types of equity assessment¹¹¹ based on effort-sharing approaches identified by the Intergovernmental Panel on Climate Change in its Fifth Assessment Report,¹¹² finds that Australia's NDC is inconsistent with three of the five types of equity assessments when assessed against the goal of limiting warming to 2°C¹¹³ and with all five of the equity assessments when assessed against the 1.5°C goal that is essential to the survival of coral reefs globally.¹¹⁴

This analysis is supported by Climate Action Tracker ("CAT"), an independent scientific analysis produced by Climate Analytics, Ecofys, and the NewClimate Institute, which has measured Australia's emissions target against over 40 effort-sharing studies used by the IPCC, and rates Australia's target as "inadequate" because it

exceeds the acceptable emissions level for Australia in all effort-sharing proposals evaluated by CAT. This means it is not consistent with limiting warming to below 2°C.... [I]f most other countries followed the Australia approach, global warming would exceed 3-4°C.¹¹⁵

Furthermore, the Climate Equity Reference Calculator, designed by EcoEquity and the Stockholm Environment Institute, demonstrates that, even if Australia meets its NDC by 2030, it would have accomplished *less than half* of what the calculator concludes is Australia's fair share of climate mitigation.¹¹⁶

3.1.2 Australia is permitting the development of massive new coal mines that will contribute substantially to climate change and to the further deterioration of the Great Barrier Reef

"[T]he contribution of the CO₂ emitted from the coal extracted from the mine over its lifetime represents a very significant contribution to the impacts being felt on the Great Barrier Reef."

- Professor Ove Hoegh-Guldberg¹¹⁷

The Australian and Queensland governments strongly support the development of new coal mines.¹¹⁸ These mines will supply coal to be burnt in coal-fired power plants,¹¹⁹ which will contribute to climate change. In particular, the governments are committed to opening six massive mines – and possibly more – in the currently undeveloped Galilee Basin in Queensland, one of the world's largest untapped coal reserves estimated to contain over 23 gigatonnes of recoverable coal.¹²⁰

The development of these mines by a relatively well-resourced country with high per-capita emissions, in a region that has not been mined before, will lock in decades of greenhouse gas emissions at a time when scientific evidence demonstrates the overwhelming majority of identified and recoverable fossil fuel reserves must remain unburned to limit warming to 2°C, as described in section 2.2 above. If all the saleable coal from the six proposed Galilee Basin mines were burned, this would constitute about three percent of the remaining budget for carbon that can be emitted globally to have a reasonable (at least 66%) chance of keeping post-industrial global warming below 2°C.¹²¹

Of those six mines, the Carmichael Coal Mine and Rail Project is most likely to be developed first. This mine would be among the largest in the world, producing up to 60 million tons of coal per year for up to 60 years.¹²² The mining and burning of coal from this mine would generate over 4.7 billion tons of greenhouse gas emissions, among the highest emissions from a single project anywhere in the world.¹²³ In fact, the average annual emissions attributable to this mine (around 79 million tons of carbon dioxide equivalent) would be greater than the annual emissions of a number of countries – including Australia, Sri Lanka, and Malaysia – and more than the total amount of carbon reductions Australia has promised to achieve under the Paris Agreement.¹²⁴

The substantial emissions that would result from burning coal from the new mines proposed in the Galilee Basin represent a real and significant threat to the Great Barrier Reef World Heritage Area¹²⁵ that will manifest over decades. Professor Ove Hoegh-Guldberg, who is the Director of the Global Change Institute and Professor of Marine Science at the University of Queensland, an Australian Research Council Laureate Fellow, and the Deputy Director of the Australian Research Council Centre of Excellence for Coral Reef Studies, has spoken directly to the relationship between the Carmichael Mine and the Great Barrier Reef:



Turtle and bleached coral, Heron Island, Great Barrier Reef.
XL Catlin Seaview Survey / Richard Vevers

As we are already above the thermal threshold for damage to reef building corals and hence coral reefs, any further addition of CO₂ into the atmosphere will directly damage the Great Barrier Reef.... *[T]he contribution of the CO₂ emitted from the coal extracted from the mine over its lifetime represents a very significant contribution to the impacts being felt on the Great Barrier Reef and across a vast number of other ecosystems, agricultural and societal activities and concerns. The true cost of the emitted carbon from the Carmichael Mine to the Great Barrier Reef and other ecosystems, businesses and human health must be calculated and attached to any decision on whether or not to proceed with the mine.*¹²⁶

Finally, scientists have criticized Australia's failure to require a cumulative impact assessment of the development of the Galilee Basin on the Great Barrier Reef World Heritage Area, noting that "the future of the Great Barrier Reef depends on transformational change in the cumulative assessment of Australian coal mines."¹²⁷ The environmental impact assessment that the project proponent prepared for the Carmichael Mine,¹²⁸ and the assessments prepared by the proponents for the other mines proposed for the Galilee Basin, did not include an assessment of the indirect or cumulative impacts of emissions from burning the coal from these mines, because federal and state legislation do not require such an assessment.¹²⁹ The result is a "tyranny of small decisions ... that describes only single increments of decline, any one of which can be rationalized by decision-makers as posing acceptable environmental risks" and which "ignore the lengthy and extensive accumulation of impacts responsible for the decline in the Reef's values."¹³⁰ Instead, scientists recommend a cumulative impact assessment for thermal coal mining that "incorporate[s] impacts at the site of the mine, the railway, port, and shipping activities used to export coal, and the greenhouse emissions of exported coal. This must be assessed in conjunction with past, present and future impacts from activities related or unrelated to mining at the spatial extent of the receiving environment, including the Reef and its catchment."¹³¹

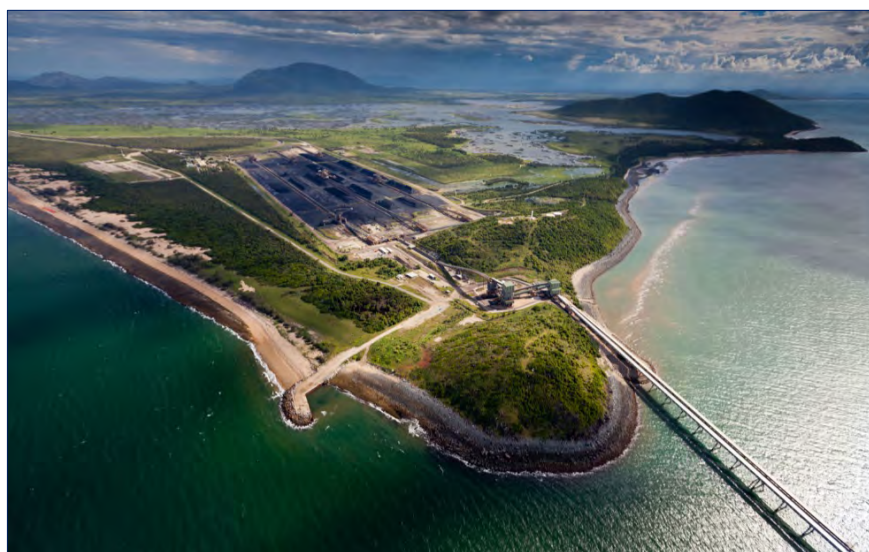
3.1.3 The Reef 2050 Plan and Australia's 2016 update to UNESCO does not address climate change

The Reef 2050 Plan, which is Australia's overarching framework for managing the Reef until 2050,¹³² and Australia's recent reports on its implementation of the plan,¹³³ all acknowledge the threat that climate change poses to the Reef. These documents make no recommendation or commitment to addressing the threat beyond a reliance on Australian policy,¹³⁴ and are silent on the impact of greenhouse gas emissions from new fossil fuel developments in Australia.¹³⁵ As the preceding sections have demonstrated, Australian government policy does not ensure that Australia is doing its fair share to reduce existing greenhouse gas emissions and to prevent new ones.

3.2 Australia is failing to adequately meet its obligation to reduce non-climate-related stressors on the Great Barrier Reef

As noted above, ocean warming and acidification make corals more susceptible to non-climate-related stressors. For this reason, the Australian government has acknowledged that increasing the resilience of the Great Barrier Reef by reducing non-climate-related stressors is more important than ever.¹³⁶ Unfortunately, it is failing to meet its obligation to do this.

First, in December 2015, the Australian government approved a dredging project to expand the coal export port at Abbot Point, which is within and adjacent to the World Heritage Area.¹³⁷ This project, for which the Queensland government is the proponent, supports the development of a new terminal (which the Australian government approved separately in 2013).¹³⁸ The expansion of Abbot Point Port is intended to facilitate the export of coal from the Galilee Basin,¹³⁹ and, if developed as proposed, Abbot Point Port would be among the largest coal ports in the world:¹⁴⁰ its export capacity would increase from 50 million tons of coal per year to between 85 and 120 million tons.¹⁴¹ The dredging project would require the offshore dredging of around 1.1 million cubic meters of previously undisturbed seabed within the World Heritage Area and the construction of onshore containment ponds for the dredge material and temporary pipeline infrastructure to pump this material to the ponds.¹⁴² The development of the new terminal would require the construction of onshore coal handling facilities, rail loops and outloading facilities, and a jetty and two ship berths.¹⁴³



Abbot Point Coal Terminal.
Greenpeace / Tom Jefferson

The expansion of Abbot Point Port would impose additional and otherwise avoidable stress on the Reef at a time when it is imperative that new threats be avoided. For example, the dredging would destroy 61 hectares of seagrass habitat.¹⁴⁴ Although the EIS concludes that about 50.5 hectares of this will be available to be recolonized within five years,¹⁴⁵ this conclusion is unsupported, and scientists have noted that it fails to account for extreme weather events (which are predicted to occur with increased frequency as the climate changes) that destroy seagrass and reduce the

availability of seed transfer.¹⁴⁶ The destruction of this seagrass habitat is concerning, because “even small losses [of seagrass meadows] are more critical in the context of the overall degraded condition of the Great Barrier Reef seagrass populations.”¹⁴⁷ Seagrass meadows, which are a vital component of coastal ecosystems, contribute to the outstanding universal value of the Reef.¹⁴⁸ However, they are under serious threat and, in the southern inshore part of the Reef where Abbot Point Port is located, they are in “very poor and deteriorating condition.”¹⁴⁹ In addition, the dredging process and dewatering of the containment ponds is expected to generate 9,938 tons of “fine silt and clay [that] may become available for re-suspension,” which is acknowledged by the EIS as a “negative impact.”¹⁵⁰ The Queensland government’s proposals to offset the loss of seagrass habitat and the resuspension of sediment by, respectively, contributing an unspecified amount of money to actions being delivered under the Reef 2050 Plan and reducing sediment runoff from local catchments,¹⁵¹ are inadequate, as they are actions Queensland should be taking regardless of the port expansion.

The Abbot Point Port expansion will also facilitate increased industrial shipping throughout the Reef, increasing the likelihood of accidents, spills, and collisions with marine animals.¹⁵² The environmental impact statement indicates that, by 2020, there will be 600 to 700 ship calls to Abbot Point (compared to 289 in 2013/2014), increasing to around 1,200 by 2032.¹⁵³ These ships are exclusively sizeable bulk carriers.¹⁵⁴ The cumulative impacts of industrial shipping include physical damage from propellers and anchors (which the EIS notes may extend up to 100 meters along the seafloor and move with currents or wind), light and noise pollution, introduction of invasive species through ballast water, contamination from toxic anti-fouling agents, vessel-based discharge, chemical or oil spills, and collisions with marine animals.¹⁵⁵ Indeed, Queensland Government records indicate that heavy fuel oil, diesel, other oils, and hydraulic fluids have been spilled 879 times at Queensland ports and in coastal water since 2002.¹⁵⁶

The preceding threats are likely not the full extent of non-climate-related stressors on the Reef from the expansion of Abbot Point Port. The environmental impact study contained serious deficiencies that make it impossible to accurately assess the full scope of the impacts. The study relied on insufficient information about the World Heritage values relevant to the project area, including the population dynamics, habitat use, and migratory behaviors of the very marine animals – dugongs, turtles, dolphins, fish, and whales – that the World Heritage Area was created to protect.¹⁵⁷ Without such baseline information, it is not credible for the study to conclude, as it did, that the effects of the port expansion would have no significant residual impact on these species. This critical research must be conducted before the expansion is allowed to proceed.

In addition to the threat to the Great Barrier Reef from the expansion of Abbot Point Port, the Reef 2050 Plan has been criticized by scientists as insufficient to “overcome or limit the trajectory of deterioration of the Reef,”¹⁵⁸ because:

- the plan does not contain sufficient scientifically justified and clearly defined targets to improve the conservation of the Reef,¹⁵⁹ and it is therefore difficult to measure actual progress;¹⁶⁰
- the plan is not enforceable, even though its effectiveness depends on its implementation and enforcement;¹⁶¹
- the plan still allows capital dredging for new or expanding ports within regulated port limits and fails to properly address the cumulative impacts of such dredging;¹⁶²
- the plan allows for the sea dumping of maintenance dredge spoil, even though it can have greater impacts than capital dredge spoil through resuspension of much finer sediments;¹⁶³ and
- the plan fails to address the long-term protection of the Reef from cumulative stressors.¹⁶⁴

In addition to problems with the Reef 2050 Plan itself, scientists have noted that Australia’s 2016 update to UNESCO on the implementation of the Plan provides “disappointingly little evidence of progress in the key areas needed to make a significant difference to a World Heritage Area that is in crisis.”¹⁶⁵ Indeed, Australia has failed to meet many of the promises made in the Reef 2050 Plan, including to control tree-clearing in Reef catchments (a major source of sediment pollution).¹⁶⁶ Australia is also well behind in meeting its 2018 water pollution targets and has failed to provide the funds necessary to deliver its promises in the Reef 2050 Plan.¹⁶⁷ A detailed analysis of Australia’s failures is available in the recent reports by the Great Barrier Reef Independent Review Group¹⁶⁸ and WWF-Australia and the Australian Marine Conservation Society.¹⁶⁹

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As a relatively well-resourced country with one of the world’s highest per-capita levels of greenhouse gas emissions, Australia has a responsibility under the World Heritage Convention to substantially reduce its current and projected emissions, to refrain from authorizing or facilitating the development of new fossil fuels, and to adequately reduce non-climate stressors. As this section demonstrates, it has failed to do so.

CONCLUSION AND RECOMMENDATIONS

The World Heritage Committee must take strong action now to ensure that Australia fulfills its obligation to protect the Great Barrier Reef World Heritage Area by reducing its contribution to climate change.

In light of the circumstances described in this report, and because the World Heritage Committee's Advisory Bodies are currently considering Australia's implementation of the Reef 2050 Plan, at its meeting in July 2017 the World Heritage Committee should:

- 1. Express its deep concern about coral bleaching and mortality in the Great Barrier Reef World Heritage Area, and about the threat that climate change poses to the health and survival of the Great Barrier Reef ecosystem;**
- 2. Call on Australia not to approve or support any new development projects that will directly, indirectly, or cumulatively harm the Great Barrier Reef World Heritage Area, including by contributing to climate change;**
- 3. Request Australia to invite a monitoring mission as soon as possible to review Australia's response to the coral bleaching crisis and the effectiveness, implementation, and funding of the Reef 2050 Long-Term Sustainability Plan, and to consider the state of conservation of the property as a whole;**
- 4. Require Australia to report annually on its progress in implementing the Reef 2050 Plan and its response to the coral bleaching crisis, including on the substantive near-term steps it is taking to immediately address the threat of climate change to the Great Barrier Reef World Heritage Area;**
- 5. Call on Australia to ensure that it meets its commitments under the Paris Agreement and does its fair share to reduce its greenhouse gas emissions;**
- 6. Inscribe the Great Barrier Reef World Heritage Area on the List of World Heritage in Danger; and**
- 7. Call on financiers not to support or fund development projects that will directly, indirectly, or cumulatively harm the Great Barrier Reef World Heritage Area.**

In addition, the Committee should perform the same analysis of the obligations of other states with World Heritage-listed coral reefs, keeping in mind that small-island states and other states with minimal greenhouse gas emissions or fossil fuel developments may have no duty beyond taking appropriate action to reduce non-climate reef stressors, possibly conditioned upon the receipt of technical and/or financial assistance from wealthier nations and/or those responsible for more emissions.

APPENDIX – Summary of assessment against criteria for the inscription of the Great Barrier Reef on the List of World Heritage in Danger

The table below is a summary of a legal assessment of whether the Great Barrier Reef World Heritage Area meets the criteria for inscription on the List of World Heritage in Danger. A more detailed assessment is available in the report, *Protecting the Great Barrier Reef: A legal assessment of the World Heritage Committee's May 2015 draft decision concerning the potential inscription of the Great Barrier Reef on the List of World Heritage in Danger*, prepared by Australian and international lawyers.¹⁷⁰

CRITERIA		LEGAL ASSESSMENT OF THE EVIDENCE
Paragraph 180 a) ASCERTAINED DANGER – The property is faced with specific and proven imminent danger, such as:	180 a) i) A serious decline in the population of the endangered species or the other species of Outstanding Universal Value for which the property was legally established to protect, either by natural factors such as disease or by man-made factors such as poaching.	The evidence satisfies this criterion.
	180 a) ii) Severe deterioration of the natural beauty or scientific value of the property, as by human settlement, construction of reservoirs which flood important parts of the property, industrial and agricultural development including use of pesticides and fertilizers, major public works, mining, pollution, logging, firewood collection, etc.	The evidence arguably satisfies this criterion.
	180 a) iii) Human encroachment on boundaries or in upstream areas which threaten the integrity of the property.	The evidence satisfies this criterion.
Paragraph 180 b) POTENTIAL DANGER – The property is faced with major threats which could have deleterious effects on its inherent characteristics. Such threats are, for example:	180 b) i) a modification of the legal protective status of the area.	The evidence does not satisfy this criterion.
	180 b) ii) planned resettlement or development projects within the property or so situated that the impacts threaten the property.	The evidence satisfies this criterion.
	180 b) iii) outbreak or threat of armed conflict.	The evidence does not satisfy this criterion.
	180 b) iv) the management plan or management system is lacking or inadequate, or not fully implemented.	The evidence satisfies this criterion.
	180 b) v) threatening impacts of climatic, geological or other environmental factors.	The evidence satisfies this criterion.

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- ¹ T. Hughes, B. Schaffelke, and J. Kerry, The Conversation, *How much coral has died in the Great Barrier Reef's worst bleaching event* (Nov. 28, 2016), <https://theconversation.com/how-much-coral-has-died-in-the-great-barrier-reefs-worst-bleaching-event-69494> (accessed Jan. 19, 2017).
- ² National Oceanic and Atmospheric Administration ("NOAA"), Ocean Service Education, *Corals – the importance of coral reefs*, http://oceanservice.noaa.gov/education/kits/corals/coral07_importance.html (accessed Feb. 21, 2017).
- ³ *Id.* See also, NOAA, *How does overfishing threaten coral reefs?*, <http://oceanservice.noaa.gov/facts/coral-overfishing.html>; Great Barrier Reef Marine Park Authority ("GBRMPA"), *About the Reef – Biodiversity*, <http://www.gbrmpa.gov.au/about-the-reef/biodiversity>; Coral Reef Systems, *The value of corals*, <http://coralreefsystems.org/content/value-corals> (all accessed Feb. 21, 2017).
- ⁴ A. Markham, E. Osipova, K. Lafrenz Samuels, and A. Caldas, *World Heritage and Tourism in a Changing Climate* (2016), page 12, available to download at <http://whc.unesco.org/en/activities/883/> (accessed Feb. 14, 2017) ("Even under the most ambitious current reduction scenarios for global greenhouse gas emissions, 70 per cent of corals worldwide are projected to suffer from long-term degradation by 2030."). See also, O. Hoegh-Guldberg, R. Cai, E.S. Poloczanska, P.G. Brewer, S. Sundby, K. Hilmi, V.J. Fabry, and S. Jung, *The Ocean*, in *Climate Change 2014: Impacts, Adaptation, and Vulnerability* (Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Chapter 30), pages 1655-1731 at page 1659, http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap30_FINAL.pdf; W. Steffen and Dr. M. Rice, Climate Council, *Climate Council alert: climate change and coral bleaching* (2016), page II, <https://www.climatecouncil.org.au/uploads/a7b164353dbf8f186b3d777720efa16d.pdf>; O. Hoegh-Guldberg, The Conversation (Mar. 3, 2016), *It's not 'doom and gloom' to point out what's really happening to coral reefs*, <https://theconversation.com/its-not-doom-and-gloom-to-point-out-whats-really-happening-to-coral-reefs-55695> (all accessed Feb. 14, 2017).
- ⁵ See, e.g., NOAA, *Anthropogenic threats to corals*, http://oceanservice.noaa.gov/education/kits/corals/coral09_humanthreats.html; International Coral Reef Initiative, *Status of and threats to coral reefs*, <http://www.icriforum.org/about-coral-reefs/status-and-threat-coral-reefs> (both accessed Feb. 21, 2017).
- ⁶ NOAA, *How does climate change affect coral reefs?*, <http://oceanservice.noaa.gov/facts/coralreef-climate.html> ("Climate change is the greatest global threat to coral reef ecosystems."); Australian Government and Queensland Government, *Reef 2050 Plan – Update on Progress* (Dec. 1, 2016), page 2, <http://www.environment.gov.au/system/files/resources/d12a31fc-7dac-42ae-a8c9-b39898cbfa26/files/reef-2050-update-progress.pdf> (accessed Jan. 25, 2017) ("[C]limate change is the single biggest threat to reefs worldwide.").
- ⁷ GBRMPA, *The Great Barrier Reef Outlook Report 2014 ("2014 Outlook Report")* (2014), page (v), available to download at <http://elibrary.gbrmpa.gov.au/jspui/handle/11017/2855> (accessed Jan. 19, 2017).
- ⁸ See generally, L. Hughes, W. Steffen, and M. Rice, Climate Council of Australia, *Australia's coral reefs under threat from climate change* (2016), pages 14-16, <https://www.climatecouncil.org.au/uploads/e3449c5187f7100528cc90c380993381.pdf> (accessed Jan. 31, 2017).
- ⁹ *Id.* See also, UNESCO World Heritage Convention, *The Future of the World Heritage Convention for Marine Conservation* (World Heritage Papers 45, Dec. 2016), pages 15, 25, 26, <http://unesdoc.unesco.org/images/0024/002468/246839e.pdf>; NOAA Coral Reef Watch, *Global coral bleaching 2014-2017: Status and an appeal for observations*, https://coralreefwatch.noaa.gov/satellite/analyses_guidance/global_coral_bleaching_2014-17_status.php (both accessed Feb. 17, 2017).
- ¹⁰ See NOAA, *What is coral bleaching?*, http://oceanservice.noaa.gov/facts/coral_bleach.html; GBRMPA, *Coral bleaching*, <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/climate-change/what-does-this-mean-for-species/corals/what-is-coral-bleaching> (both accessed Feb. 19, 2017).
- ¹¹ A. King, D. Karoly, M. Black, O. Hoegh-Guldberg, and S. Perkins-Kirkpatrick, The Conversation, *Great Barrier Reef bleaching would be almost impossible without climate change* (Apr. 28, 2016), <https://theconversation.com/great-barrier-reef-bleaching-would-be-almost-impossible-without-climate-change-58408>; GBRMPA, *Great Barrier Reef Region Strategic Assessment: Strategic assessment report ("Strategic Assessment Report")* (2014), page 5-4,

available to download at <http://elibrary.gbrmpa.gov.au/jspui/handle/11017/2861> (“The frequency and severity of coral bleaching is predicated to increase under climate change.”); ARC Centre of Excellence for Coral Reef Studies, *Life and death after Great Barrier Reef bleaching* (Nov. 29, 2016), <https://www.coralcoe.org.au/media-releases/life-and-death-after-great-barrier-reef-bleaching>; T. Hughes *et al.*, *How much coral has died in the Great Barrier Reef’s worst bleaching event*, above n. 1; ARC Centre of Excellence for Coral Reef Studies, *Great Barrier Reef risks losing tolerance to bleaching events* (Apr. 15, 2016), <http://www.coralcoe.org.au/media-releases/great-barrier-reef-risks-losing-tolerance-to-bleaching-events> (all accessed Jan. 30, 2017).

¹² A. Markham *et al.*, *World Heritage and Tourism in a Changing Climate*, above n. 4, page 12 (citations omitted).

¹³ R. van Hooidonk, J. Maynard, J. Tamelander, J. Gove, G. Ahmadi, L. Raymundo, G. Williams, S.F. Heron, and S. Planes, “Local-scale projections of coral reef futures and implications of the Paris Agreement,” *Scientific Reports* 6, 39666 (2016), http://www.nature.com/articles/srep39666?WT.feed_name=subjects_ecology (accessed Feb. 20, 2017). *See also*, NOAA Coral Reef Watch, *Downscaled climate model projections of coral bleaching conditions (4-km resolution)*, https://coralreefwatch.noaa.gov/climate/projections/downscaled_bleaching_4km/index.php; UNEP – Environment Live, *Local-scale climate model projections of future coral bleaching*, <http://uneplive.unep.org/theme/index/19#about> (both accessed Feb. 21, 2017).

¹⁴ O. Hoegh-Guldberg *et al.*, *The Ocean*, in *Climate Change 2014: Impacts, Adaptation, and Vulnerability*, above n. 4, page 1659. *See also*, W. Steffen, and Dr. M. Rice, Climate Council, *Climate Council alert: climate change and coral bleaching*, above n. 4, page II; O. Hoegh-Guldberg, *It’s not ‘doom and gloom’ to point out what’s really happening to coral reefs*, above n. 4.

¹⁵ A. Markham *et al.*, *World Heritage and Tourism in a Changing Climate*, above n. 4, page 12; K. Frieler, M. Meinshausen, A. Golly, M. Mengel, K. Lebek, S.D. Donner, and O. Hoegh-Guldberg, “Limiting global warming to 2°C is unlikely to save most coral reefs,” *Nature Climate Change* (Vol. 3, Feb. 2013), pages 165-170. *See also*, UNESCO, *World Oceans Day: healthy oceans – healthy planet* (Jun. 8, 2016), <http://whc.unesco.org/en/news/1507> (accessed Feb. 14, 2016) (“For coral reefs and many other marine ecosystems, keeping climatic warming to the Paris Agreement’s long-term goal of 1.5°C is essential.”).

¹⁶ World Heritage Committee, 39 COM 7B.7 (2015), para. 3, <http://whc.unesco.org/en/decisions/6216> (accessed Jan. 19, 2017).

¹⁷ R. Vevers, quoted in, M. Slezak, *The Guardian*, *The Great Barrier Reef: a catastrophe laid bare* (Jun. 6, 2016), <https://www.theguardian.com/environment/2016/jun/07/the-great-barrier-reef-a-catastrophe-laid-bare> (accessed Feb. 15, 2017).

¹⁸ I. Bokova, quoted in, UNESCO, *Damage to Great Barrier Reef assessed; stricter shipping surveillance proposed* (Apr. 26, 2010), <http://whc.unesco.org/en/news/606/> (accessed Jan. 19, 2017).

¹⁹ UNESCO, *Great Barrier Reef*, <http://whc.unesco.org/en/list/154> (accessed Jan. 19, 2017).

²⁰ GBRMPA, *Facts about the Great Barrier Reef*, <http://www.gbrmpa.gov.au/about-the-reef/facts-about-the-great-barrier-reef> (accessed Jan. 30, 2017).

²¹ D. Attenborough, quoted in, M. Slezak, *The Great Barrier Reef: a catastrophe laid bare*, above n. 17.

²² *See generally*, World Heritage Committee, 39 COM 7B.7, above n. 16, para. 3.

²³ *See* Earthjustice and Environmental Justice Australia, *Protecting the Great Barrier Reef: A legal assessment of the World Heritage Committee’s draft decision concerning the potential inscription of the Great Barrier Reef on the List of World Heritage in Danger* (June 2015), www.earthjustice.org/greatbarrierreef (accessed Jan. 19, 2017). The World Heritage Convention empowers the Committee to place a World Heritage property on the List of World Heritage in Danger where the site is threatened by “serious and specific” dangers: *see Convention Concerning the Protection of the World Cultural and Natural Heritage* (1972), Art. 11(4), <http://whc.unesco.org/en/conventiontext/> (accessed Jan. 19, 2017). The Operational Guidelines for the Implementation of the World Heritage Convention establish two cases for inscription on the List of World Heritage in Danger, “ascertained danger” and “potential danger,” and then enumerate eight criteria for these cases: *see* Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage, *Operational Guidelines for the Implementation of the World Heritage Convention* (“Operational Guidelines”) (WHC.16/01, Oct. 26, 2016), para. 180, available to download at <http://whc.unesco.org/en/guidelines/> (accessed Feb. 14, 2017). Art. 11(4) of the World Heritage Convention also provides that, for a World Heritage property to be added to the List of World Heritage in Danger, “major operations” must be necessary for its conservation. There is no doubt that

“major operations” are required to conserve the Reef; this is demonstrated by the Australian government’s commitment of significant funding for the Reef and the criticisms by scientists that the amount committed is insufficient: see A. Morton, Sydney Morning Herald, *No new funding or climate commitments in Great Barrier Reef update* (Dec. 2, 2016), <http://www.smh.com.au/federal-politics/political-news/no-new-funding-or-climate-commitments-in-great-barrier-reef-update-20161201-gt20a3.html>; S. Small, ABC News, *Great Barrier Reef: cost to save reef tops \$8 billion, report finds* (Aug. 11, 2016), <http://www.abc.net.au/news/2016-08-11/great-barrier-reef-cost-to-save-reef-tops-8-billion-dollars/7721652> (both accessed Feb. 15, 2017). Finally, Art. 11(4) requires that assistance must be requested for the site under the Convention. Such assistance may be requested by any World Heritage Committee member or the Secretariat: see World Heritage Committee, *Operational Guidelines*, para. 177(d) (“[T]he Committee is of the view that its assistance in certain cases may most effectively be limited to messages of its concern, including the message sent by inscription of a property on the List of World Heritage in Danger and that such assistance may be requested by any Committee member or the Secretariat.”). As evident from the time and resources the Committee has invested in considering whether to inscribe the Reef on the List of World Heritage in Danger, this requirement has clearly been met.

²⁴ World Heritage Committee, *Operational Guidelines*, above n. 23, para. 178.

²⁵ The legal assessment is available in Earthjustice and Environmental Justice Australia, *Protecting the Great Barrier Reef: A legal assessment of the World Heritage Committee’s draft decision concerning the potential inscription of the Great Barrier Reef on the List of World Heritage in Danger*, above n. 23.

²⁶ See, e.g., T.P. Hughes, J.C. Day, and J. Brodie, “Securing the future of the Great Barrier Reef,” *Nature Climate Change* 5, 508-511 (April 6, 2015), pages 1, 2; GBRMPA, *2014 Outlook Report*, above n. 7, pages 19, 20, 23, 32-35.

²⁷ GBRMPA, *2014 Outlook Report*, above n. 7, page (v).

²⁸ *Id.*, pages (v), 160, 166. See also, A. Markham et al., *World Heritage and Tourism in a Changing Climate*, above n. 4, page 9 (“Climate change is a threat multiplier, and will increase vulnerability and exacerbate other stresses.”).

²⁹ ARC Centre of Excellence for Coral Reef Studies, *Only 7% of the Great Barrier Reef has avoided coral bleaching*, (April 20, 2016), <https://www.coralcoe.org.au/media-releases/only-7-of-the-great-barrier-reef-has-avoided-coral-bleaching> (accessed Feb. 19, 2017).

³⁰ T. Hughes et al., *How much coral has died in the Great Barrier Reef’s worst bleaching event*, above n. 1; ARC Centre of Excellence for Coral Reef Studies, *Life and death after Great Barrier Reef bleaching*, above n. 11; GBRMPA, *The facts on Great Barrier Reef coral mortality* (Jun. 3, 2016), <http://www.gbrmpa.gov.au/media-room/latest-news/coral-bleaching/2016/the-facts-on-great-barrier-reef-coral-mortality> (accessed Feb. 19, 2017). See also, M. Innis, The New York Times, *Great Barrier Reef hit by worst coral die-off on record, scientists say* (Nov. 29, 2016), https://www.nytimes.com/2016/11/29/world/australia/great-barrier-reef-coral-bleaching.html?_r=2 (accessed Jan. 31, 2017). For a photographic essay on the bleaching process in the Great Barrier Reef, see J. Marshall, The Conversation, *In pictures: a close-up look at the Great Barrier Reef’s bleaching* (Apr. 12, 2016), <https://theconversation.com/in-pictures-a-close-up-look-at-the-great-barrier-reefs-bleaching-57495> (accessed Jan. 31, 2017).

³¹ Australian Government and Queensland Government, *Reef 2050 Plan – Update on Progress*, above n. 6, pages 2, 5, 25.

³² A. King et al., *Great Barrier Reef bleaching would be almost impossible without climate change*, above n. 11; ARC Centre of Excellence for Climate System Science, *Barrier reef attribution study: data and methodology* (April 28, 2016), <https://www.climate-science.org.au/content/976-barrier-reef-attribution-study-data-and-methodology> (accessed Feb. 19, 2017). See also, M. Slezak, The Guardian, *Great Barrier Reef bleaching made 175 times likelier by human-caused climate change, say scientists* (Apr. 28, 2016), <http://www.theguardian.com/environment/2016/apr/29/great-barrier-reef-bleaching-made-175-times-likelier-by-human-caused-climate-change-say-scientists> (accessed Jan. 25, 2017).

³³ D. Tarte, B. Hart, T. Hughes, and K. Hussey, *Reef 2050 Long-Term Sustainability Plan – Progress on Implementation – Review by the Great Barrier Reef Independent Review Group* (Feb. 2017), page 31, <http://apo.org.au/files/Resource/pub-reef-2050-long-term-sustainability-plan-21feb17.pdf> (accessed Feb. 27, 2017).

³⁴ T. Hughes et al., *How much coral has died in the Great Barrier Reef’s worst bleaching event*, above n. 1; ARC Centre of Excellence for Coral Reef Studies, *Life and death after Great Barrier Reef bleaching*, above n. 11.

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- ³⁵ T. Hughes *et al.*, *How much coral has died in the Great Barrier Reef's worst bleaching event*, above n. 1. See also, B. Millington, ABC News, *Great Barrier Reef: most coral now dead north of Port Douglas off far north Queensland, scientists say* (Oct. 25, 2016), <http://www.abc.net.au/news/2016-10-26/great-barrier-reef-coral-now-dead-north-of-port-douglas-qld/7966162> (accessed Mar. 1, 2017).
- ³⁶ T. Hughes *et al.*, *How much coral has died in the Great Barrier Reef's worst bleaching event*, above n. 1.
- ³⁷ ARC Centre of Excellence for Coral Reef Studies, *Only 7% of the Great Barrier Reef has avoided coral bleaching*, above n. 29. See also, GBRMPA, *Strategic Assessment Report*, above n. 11, pages 7-6, 7-11, 7-13 to 7-15.
- ³⁸ T. Hughes *et al.*, *How much coral has died in the Great Barrier Reef's worst bleaching event*, above n. 1; ARC Centre of Excellence for Coral Reef Studies, *Life and death after Great Barrier Reef bleaching*, above n. 11.
- ³⁹ *Id.*
- ⁴⁰ GBRMPA, *Latest detailed observed forecast and environmental conditions – Update 3: 14 February 2017*, <http://www.gbrmpa.gov.au/visit-the-reef/current-conditions-on-the-great-barrier-reef/latest-detailed-observed-forecast-and-environmental-conditions> (accessed Feb. 21, 2017).
- ⁴¹ See E. Hunt, *The Guardian*, *Images of new bleaching on Great Barrier Reef heighten fears of coral death* (Feb. 19, 2017), <https://www.theguardian.com/environment/2017/feb/20/images-of-new-bleaching-on-great-barrier-reef-heighten-fears-of-coral-death> (accessed Feb. 21, 2017).
- ⁴² NOAA Coral Reef Watch, *Global coral bleaching 2014-2017: Status and an appeal for observations*, above n. 9.
- ⁴³ T. Hughes *et al.*, *How much coral has died in the Great Barrier Reef's worst bleaching event*, above n. 1; GBRMPA, *Interim report: 2016 coral bleaching event on the Great Barrier Reef* (Sept. 2016), pages 1, 17, <http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/3044/5/Interim%20report%20on%202016%20coral%20bleaching%20event%20in%20GBRMP.pdf> (accessed Jan. 30, 2017).
- ⁴⁴ ARC Centre of Excellence for Coral Reef Studies, *Life and death after Great Barrier Reef bleaching*, above n. 11; T. Hughes *et al.*, *How much coral has died in the Great Barrier Reef's worst bleaching event*, above n. 1.
- ⁴⁵ *Id.* See also, A. King *et al.*, *Great Barrier Reef bleaching would be almost impossible without climate change*, above n. 11; ARC Centre of Excellence for Coral Reef Studies, *Great Barrier Reef risks losing tolerance to bleaching events*, above n. 11; GBRMPA, *Strategic Assessment Report*, above n. 11, page 5-4.
- ⁴⁶ L. Hughes *et al.*, *Australia's coral reefs under threat from climate change*, above n. 8, page 10; A. King *et al.*, *Great Barrier Reef bleaching would be almost impossible without climate change*, above n. 11; ARC Centre of Excellence for Climate System Science, *Barrier reef attribution study: data and methodology*, above n. 32.
- ⁴⁷ J. Marshall, *The Guardian*, *As a worker on the Great Barrier Reef I'm ashamed to look my children in the eye* (Jun. 6, 2016), <https://www.theguardian.com/australia-news/2016/jun/07/as-a-worker-on-the-great-barrier-reef-im-ashamed-to-look-my-children-in-the-eye> (accessed Mar. 1, 2017).
- ⁴⁸ The Great Barrier Reef Marine Park Authority is an Australian federal body established under statute: see generally, *Great Barrier Reef Marine Park Act 1975* (Cth), Part II, <https://www.legislation.gov.au/Details/C2016C00551>; GBRMPA, *Corporate information*, <http://www.gbrmpa.gov.au/about-us/corporate-information> (both accessed Feb. 15, 2017).
- ⁴⁹ GBRMPA, *2014 Outlook Report*, above n. 7, page 266.
- ⁵⁰ World Heritage Committee, 39 COM 7B.7 (2015), above n. 16.
- ⁵¹ Australian Government, *State Party Report on the State of Conservation of the Great Barrier Reef World Heritage Area (Australia)* (2015), pages 52-59, <http://www.environment.gov.au/system/files/resources/cb36afd7-7f52-468a-9d69-a6bdd7da156b/files/gbr-state-party-report-2015.pdf> (accessed Jan. 30, 2017).
- ⁵² *Id.*, pages 57-58.
- ⁵³ GBRMPA, *Coral bleaching*, above n. 10; ARC Centre of Excellence for Coral Reef Studies, *Coral bleaching and the Great Barrier Reef* (March 1, 2016), <http://www.coralcoe.org.au/resources/for-managers/coral-bleaching-and-the-great-barrier-reef>; NOAA, *What is coral bleaching?* above n. 10; GBRMPA, *Climate change impacts on coral reefs*, <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/climate-change/what-does-this-mean-for-habitats/coral-reefs>; N. Graham *et al.*, "Climate warming, marine protection areas, and the ocean-scale integrity of coral reef ecosystems," *PLOS One* (2008), <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0003039>; D.J. Booth and G.A. Beretta, "Changes in a fish assemblage after a coral bleaching event," *Marine Ecology Progress Series*, Vol. 245: 205-2012 (2002), <http://www.int-res.com/articles/meps2002/245/m245p205.pdf>; N. Graham *et al.*, "Dynamic fragility of oceanic

coral reef ecosystems,” *PNAS*, Vol. 103, No. 22, 8425-8429 (May 30, 2006), <http://www.pnas.org/content/103/22/8425.full.pdf>; G.P. Jones *et al.*, “Coral decline threatens fish biodiversity in marine reserves,” *PNAS*, Vol. 101, No. 21, 8251-8253 (May 25, 2004), <http://www.pnas.org/content/101/21/8251.full.pdf> (all accessed Feb. 28, 2017).

⁵⁴ World Heritage Committee, *Operational Guidelines*, above n. 23, para. 49.

⁵⁵ *Convention Concerning the Protection of the World Cultural and Natural Heritage* (“World Heritage Convention”) (1972), Preamble, Arts. 1, 2, 11(2), <http://whc.unesco.org/en/conventiontext/> (accessed Feb. 14, 2017).

⁵⁶ *World Heritage Convention*, Preamble.

⁵⁷ *Id.*

⁵⁸ *Id.*, Art. 6(1). This duty is reflected in the World Heritage system of “international co-operation and assistance designed to support States Parties ... in their efforts to conserve” world heritage. *Id.*, Art. 7.

⁵⁹ *Id.*, Art. 4 (“[T]he duty of ensuring the ... protection, conservation ... and transmission to future generations of [world heritage] situated on its territory, belongs primarily to that State.”). See also, D. Hunter, J. Salzman, and D. Zaelke, *International Environmental Law and Policy* (2011, 4th ed.), page 1129 (“Each party to the [Convention] is first and foremost responsible for the preservation and protection” of World Heritage properties within its territory.); T. Stephens, *The Conversation, The Great Barrier Reef at a crossroads* (Jun. 4, 2012), <https://theconversation.com/the-great-barrier-reef-at-a-crossroads-7161> (accessed Feb. 2, 2017) (“This [world heritage] listing gives the [Australian] federal government lead responsibility in ensuring the [Great Barrier Reef] is appropriately protected.”). See also, *World Heritage Convention*, Preamble (“[I]t is incumbent on the international community as a whole to participate in the protection of [World Heritage], by the granting of collective assistance which, although not taking the place of action by the State concerned, will serve as an efficient complement thereto”).

⁶⁰ *World Heritage Convention*, Art. 4; *id.* Art. 5(4) (States must “endeavor, in so far as possible, and as appropriate for each country” to take appropriate measures necessary to meet their obligations).

⁶¹ All properties nominated for inscription on the World Heritage List must satisfy the conditions of integrity, which is a “measure of the wholeness and intactness” of the property. The *Operational Guidelines* provide criteria for assessing the integrity of a property. See *Operational Guidelines*, above n. 23, paras. 87-95.

⁶² *Operational Guidelines*, above n. 23, para. 96.

⁶³ The content of a state’s obligation to protect and conserve its own World Heritage properties must be informed by the criteria for a property’s inscription on the List of World Heritage in Danger: where a property is threatened by an existing and known danger such as a decline in the population of a species of outstanding universal value or a severe deterioration of the natural beauty or scientific value (known as “ascertained danger”) or a “potential danger” that *could* have deleterious effects (such as a management plan or system that is inadequate or not fully implemented, or the threatening impacts of climatic factors). See *Operational Guidelines*, above n. 23, para. 180.

⁶⁴ UNESCO World Heritage Centre, *Policy document on the impacts of climate change on world heritage properties* (2008), page 12, available to download at <http://whc.unesco.org/en/CC-policy-document/> (accessed Feb. 1, 2017).

⁶⁵ See generally, *Paris Agreement* (2015), Art. 2.1(a),

http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf (accessed Feb. 24, 2017). See also, United Nations Framework Convention on Climate Change (“UNFCCC”), *The Paris Agreement*, http://unfccc.int/paris_agreement/items/9485.php (accessed Feb. 21, 2017).

⁶⁶ United States Environmental Protection Agency, *Global greenhouse gas emissions data*, <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data> (accessed Feb. 21, 2017).

⁶⁷ See Intergovernmental Panel on Climate Change (“IPCC”), *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]*, page 63, http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf (accessed Feb. 27, 2017) (“Warming caused by CO₂ emissions is effectively irreversible over multi-century timescales unless measures are taken to remove CO₂ from the atmosphere. Ensuring CO₂-induced warming remains likely less than 2°C requires cumulative CO₂ emissions from all anthropogenic sources to remain below about 3650 GtCO₂ (1000 GtC), over half of which were already emitted by 2011.”). See also *id.*, page 64 and Table 2.2. See generally, UNFCCC, *Fact sheet: the need for mitigation*, http://unfccc.int/press/fact_sheets/items/4988.php; UNFCCC, *Focus: Mitigation – action on mitigation: reducing*

emissions and enhancing sinks, <http://unfccc.int/focus/mitigation/items/7171.php>; Union of Concerned Scientists, *Global warming solutions: reduce emissions*, <http://www.ucsusa.org/our-work/global-warming/solutions/global-warming-solutions-reduce-emissions#.WKzNW1XyuM8> (all accessed Feb. 21, 2017).

⁶⁸ *World Heritage Convention*, Art. 4.

⁶⁹ *Id.*, Art. 5(4).

⁷⁰ See generally, Centre for International Sustainable Development Law, *The principle of common but differentiated responsibilities: origins and scope* (2002), http://cisdl.org/public/docs/news/brief_common.pdf (accessed Jan. 23, 2017).

⁷¹ *Rio Declaration on Environment and Development* (1992), Art. 7. See also, *United Nations Framework Convention on Climate Change* (1992), Art. 3(1) (Parties must protect the climate system “on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.”).

⁷² *United Nations Framework Convention on Climate Change* (1992), Art. 3(1).

⁷³ UNESCO World Heritage Centre, *Policy document on the impacts of climate change on world heritage properties*, above n. 64, page 7.

⁷⁴ For example, in relation to the Great Barrier Reef World Heritage Area, the Australian government has said that “[m]ore than ever, a focus on building resilience by reducing all threats is important in protecting the Region’s ecosystem and its Outstanding Universal Value into the future.” See GBRMPA, *2014 Outlook Report*, above n. 7, page 266.

⁷⁵ See UNFCCC, *Aggregate effect of the intended nationally determined contributions: an update; Synthesis report by the Secretariat* (FCCC/CP/2016/2) (May 2, 2016), <http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf> (accessed Feb. 19, 2017). This report indicates that if the Intended Nationally Determined Contributions are fully implemented, by 2030 global emissions would reach 56.2GtCO_{2e}, which is 15.2GtCO_{2e} above the 2030 emissions level that would be required for the least-cost path to limiting warming to 2°C. *Id.*, paras. 24, 35, 39, Figure 2 (para. 40). However, given that greenhouse gas emissions “are long-lived in the atmosphere and cumulative emissions therefore determine the impact on the climate system, higher emissions in the early years (compared with least-cost trajectories) would necessitate lower and overall likely more costly reductions later on in order to keep global mean temperatures below the same level with the same likelihood.” *Id.*, para. 221. The IPCC has also noted that “[d]elaying mitigation efforts beyond those in place today through 2030 is estimated to substantially increase the difficulty of the transition to low longer-term emissions levels and narrow the range of options consistent with maintaining temperature change below 2°C. ...Due to these increased mitigation challenges, many models with annual 2030 GHG emissions higher than 55GtCO_{2e} could not produce scenarios reaching atmospheric concentration levels that make it about as likely as not that temperature change will remain below 2°C.” See IPCC, *Summary for Policymakers*, in *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, page 12, http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf (accessed Feb. 19, 2017). See also, United Nations Environment Programme, *The Emissions Gap Report 2016* (Nov. 2016), pages xvii-xviii, available to download at <http://web.unep.org/emissionsgap/resources> (accessed Feb. 19, 2017) (“Comparing the cost-optimal 2°C and 1.5°C scenarios to the unconditional Intended Nationally Determined Contribution projections shows a gap in 2030 of 14 GtCO_{2e} (range: 10-16) between the unconditional Intended Nationally Determined Contribution scenario and the 2°C scenario. Comparing the unconditional Intended Nationally Determined Contribution scenario with the 1.5°C scenario would further increase the gap by three GtCO_{2e}.”). See also, *id.*, pages 10-22; International Energy Agency, *Energy and Climate Change – World Energy Outlook – Special Briefing for COP 21* (2015), http://www.iea.org/media/news/WEO_INDC_Paper_Final_WEB.PDF, page 4 (“Pledges for COP21 will have a positive impact on future energy sector trends, but fall short of the major course correction required to achieve the agreed climate goal. If climate ambition is not raised progressively, it is estimated that the path set by the INDCs would be consistent with an average global temperature increase of around 2.7 degrees Celsius (°C) by 2100, falling short of limiting the increase to no more than 2°C. The INDCs must therefore be viewed as an important base upon which to build ambition.”); UNFCCC, *Synthesis report on the aggregate effect of intended nationally determined contributions*,

http://unfccc.int/focus/indc_portal/items/9240.php; Carbon Brief, *UN report: climate pledges fall short of cheapest route to 2C limit* (Oct. 30, 2015), <https://www.carbonbrief.org/un-report-climate-pledges-fall-short-of-cheapest-route-to-2c-limit> (both accessed Feb. 19, 2017).

⁷⁶ *World Heritage Convention*, Art. 6(3).

⁷⁷ See, e.g., Climate Council, *Galilee Basin – unburnable coal* (2015), pages 1, 4, 13, <https://www.climatecouncil.org.au/uploads/af9ceab751ba2d0d3986ee39e1ef04fd.pdf> (accessed Feb. 21, 2017). “Tackling climate change effectively means that existing coal mines will need to be retired before they are exploited fully and new mines cannot be built.” *Id.*, page 4.

⁷⁸ See, e.g., International Energy Agency, *Energy and Climate Change – World Energy Outlook Special Report* (2015), pages 18-19, <https://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf> (accessed Feb. 20, 2017); M. Lazarus, and K. Tempest, Stockholm Environment Institute, *Discussion Brief – Fossil fuel supply, green growth, and unburnable carbon* (2014), page 2, http://sei-us.org/Publications_PDF/SEI-DB-2014-Fossil-fuels-green-growth-unburnable-carbon.pdf (“Another key concept is that of ‘lock-in’: that once fossil fuel infrastructure is built, it becomes difficult to avoid using it throughout its full economic lifetime. Lock-in is both a financial and a political economy phenomenon: as new infrastructure is built, and capital investments are financed, marginal costs of production drop, and incumbent interests will act to ensure its continued operation. Supply-side investments in expanding fossil fuel extraction (e.g. coal mines, gas and oil deposits) render economies and societies reliant upon and thus supportive of fossil fuels, creating the economic and political constituencies that perpetuate global high-emission pathways.”); P. Erikson, M. Lazarus, and K. Tempest, Stockholm Environment Institute, *Discussion Brief – Carbon lock-in from fossil fuel supply infrastructure* (2015), <https://www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-DB-2015-Carbon-lock-in-supply-side.pdf> (“The essence of carbon lock-in is that, once certain carbon-intensive investments are made, and development pathways are chosen, fossil fuel dependence and associated carbon emissions can become ‘locked in’, making it more difficult to move to lower-carbon pathways and thus reduce climate risks.”) (both accessed Feb. 14, 2017).

⁷⁹ International Energy Agency, *World Energy Outlook 2012* (2012), page 261, http://www.iea.org/publications/freepublications/publication/WEO2012_free.pdf (accessed Feb. 14, 2017). See also, International Energy Agency, *Energy and Climate Change – World Energy Outlook Special Report*, above n. 78, page 83 (“[E]very year that passes locks in further fossil-fuel generation and consequent emissions growth...”).

⁸⁰ United Nations Environment Programme, *The Emissions Gap Report 2016*, above n. 75, page 9. See also, G. Muttitt, Oil Change International, *The Sky’s Limit* (Sep. 2016), pages 31-35, http://priceofoil.org/content/uploads/2016/09/OCI_the_skys_limit_2016_FINAL_2.pdf (accessed Feb. 14, 2017). “In recent years, many governments have adopted the apparently contradictory goals of reducing emissions while encouraging increased fossil fuel extraction. In the absence of [carbon capture and storage], these two goals cannot both be achieved at a global level: if emissions are to be reduced, total fossil fuel consumption must be reduced, which in turn means that total fossil fuel extraction must be reduced as well.” *Id.*, at page 33.

⁸¹ See generally, Earthjustice, Sierra Club, and Defenders of Wildlife, *Re: Notice of Intent to Prepare a Programmatic Environmental Impact Statement To Review the Federal Coal Program* (Jul. 28, 2016), pages 12-20, http://content.sierraclub.org/environmentallaw/sites/content.sierraclub.org/environmentallaw/files/Sierra%20Club%20Earthjustice%20Defenders%20of%20Wildlife_16-07-28%20Final%20Federal%20Coal%20Leasing%20PEIS%20Comments.pdf (accessed Feb. 24, 2017).

⁸² See, e.g., Dr. R. Denniss, The Australia Institute, *Individual expert report for computable general equilibrium modelling and cost benefit analysis* (Mar. 16, 2015), pages 4-5, 7-8, <http://envlaw.com.au/wp-content/uploads/carmichael45.pdf>. *Id.*, page 19 (“[T]he Carmichael mine will increase world coal supply, reduce world coal prices and increase world greenhouse gas emissions.”). See also Dr. T.M. Power, *The greenhouse gas impact of exporting coal from the west coast – an economic analysis* (2015), page 5, <https://grist.files.wordpress.com/2011/07/coal-power-white-paper.pdf> (“Lower coal prices and lower costs of using coal, in general, encourage higher levels of consumption while higher prices and costs discourage consumption.”); Oil Change International, *The Sky’s Limit*, above n. 80, pages 33-34 (“While climate policy has addressed fossil fuels almost entirely on the demand side, there has been an implicit assumption that markets will then simply allocate the aggregate demand between suppliers. However, this is not how energy markets

work. ... This should not be surprising, as it is what basic economic theory tells us: supply does not simply passively match demand, but interacts with it in dynamic equilibrium.”); A. Grech, R.L. Pressey, J.C. Day, “Coal, Cumulative Impacts, and the Great Barrier Reef,” *Conservation Letters* (Vol. 9., Issue 3, pages 200-207), page 204, <http://onlinelibrary.wiley.com/doi/10.1111/conl.12208/epdf> (“The coal industry is often viewed as a zero-sum game: current trading partners will source thermal coal from elsewhere if Australia does not supply it. However, the reality is that each new Australian coal mine will contribute greenhouse gas emissions that exacerbate the risk of climate change generally, and climate-related impacts on the Reef specifically.”); M. Lazarus, P. Erickson, and K. Tempest, Stockholm Environment Institute, *Supply-side climate policy; the road less taken* (Working Paper 2015-13, Oct. 2015), http://sei-us.org/Publications_PDF/SEI-WP-2015-13-Supply-side-climate-policy.pdf (all accessed Feb. 24, 2017).

⁸³ Oil Change International, *The Sky’s Limit*, above n. 80, pages 5-6, 15, 17-22.

This conclusion is “based on an assumption that carbon capture and storage (CCS) is not widely deployed. CCS is a process in which some of the CO₂ released from burning fossil fuels is captured, compressed, and stored underground in deep geological reservoirs – thus enabling fossil fuels to be burned without releasing all of their carbon into the atmosphere. The problem is that the technology needed is far from proven: it has been deployed only in a few pilot settings, and without significant success...; meanwhile, there are reasons to believe its costs may remain prohibitive, and questions about its environmental safety.” *Id.*, page 15.

⁸⁴ C. McGlade and P. Elkins, “The geographical distribution of fossil fuels unused when limiting global warming to 2°C,” *Nature* (Vol. 517, Jan. 8, 2015), pages 187-190; M. Jakob and J. Hilaire, “Unburnable fossil-fuel reserves,” *Nature* (Vol. 517, Jan. 8, 2015), pages 150-152.

⁸⁵ Climate Council, *Unburnable carbon: why we need to leave fossil fuels in the ground* (2015), pages (iv), 2, 27), <http://www.climatecouncil.org.au/uploads/a904b54ce67740c4b4ee2753134154b0.pdf>; Climate Council, *Galilee Basin – unburnable coal*, above n. 77, pages 1, 5, 7, 12.

⁸⁶ World Heritage Committee, 37 COM 7 – *Emerging trends and general issues* (2013), para. 8, <http://whc.unesco.org/en/decisions/5018/> (accessed Feb. 1, 2017) (“The World Heritage Committee ... [n]otes with concern the growing impact of the extractive industries on World Heritage properties, and urges all States Parties to the Convention and leading industry stakeholders, to respect the ‘No-go’ commitment by not permitting extractives activities within World Heritage properties, and by making every effort to ensure that extractives companies located in their territory cause no damage to World Heritage properties, in line with Article 6 of the Convention.”).

⁸⁷ *Id.*, para. 9 (“The World Heritage Committee ... requests the World Heritage Centre and the Advisory Bodies to continue a dialogue with the extractive industries on extending the commitment made by Shell and the International Council on Mining and Metals (ICMM) to not explore or develop oil, gas and mineral resources within World Heritage properties to other companies and parts of the industry, and also to ensure that existing and future operations in areas surrounding World Heritage properties are compatible with the protection of their Outstanding Universal Value and do not threaten their integrity.”).

⁸⁸ International Union for Conservation of Nature (“IUCN”), *IUCN World Heritage Advice Note: Mining and oil/gas projects* (Mar. 4, 2013), page 1, http://cmsdata.iucn.org/downloads/iucn_advice_note_on_mining_in_wh_sites_final_060512_2_pdf (accessed Feb. 1, 2017).

⁸⁹ *Id.*, page 2.

⁹⁰ *Id.* The IUCN reiterated this requirement in its advice note on environmental assessment: see IUCN, *World Heritage Advice Note: Environmental assessment* (Nov. 18, 2013), pages 6, 12, https://www.iucn.org/sites/dev/files/import/downloads/iucn_advice_note_environmental_assessment_18_11_13_iucn_template.pdf (accessed Feb. 1, 2017).

⁹¹ World Heritage Committee, 37 COM 7B.10 (2013), para. 3, <http://whc.unesco.org/en/decisions/4959> (accessed Feb. 2, 2017).

⁹² See *Policy for the integration of a sustainable development perspective into the processes of the World Heritage Convention* (adopted by the General Assembly of the States Parties to the Convention at its 20th session (Paris 2015) by resolution 20 GA 13), available to download at <http://whc.unesco.org/en/sustainabledevelopment/> (accessed Feb. 1, 2017).

⁹³ *Id.*, pages 2, 3, 5.

⁹⁴ O. Hoegh-Guldberg, quoted in, M. McKenzie-Murray, *The Saturday Paper*, *The real story on the Great Barrier Reef* (Jun. 4, 2016), <https://www.thesaturdaypaper.com.au/news/politics/2016/06/04/the-real-story-the-great-barrier-reef/14649624003332> (accessed Feb. 27, 2017).

⁹⁵ The World Bank, *CO2 emissions (metric tons per capita)*, http://data.worldbank.org/indicator/EN.ATM.CO2E.PC?view=chart&year_high_desc=true; Union of Concerned Scientists, *Each country's share of CO2 emissions*, http://www.ucsusa.org/global_warming/science_and_impacts/science/each-countrys-share-of-co2.html#.WLBuFXyuM8; Next 10, *California Green Innovation Index (International Edition)* (2015), pages 58-59, <http://next10.org/sites/next10.org/files/2015-Green-Innovation-Index.pdf> (all accessed Feb. 24, 2017).

⁹⁶ *Paris Agreement*, above n. 65, Art. 2.1(a).

⁹⁷ *Id.*, Art. 4.3. See also, UNFCCC, *The Paris Agreement*, above n. 65 (“The Paris Agreement requires all Parties to put forward their best efforts through ‘nationally determined contributions’ (NDCs) and to strengthen these efforts in the years ahead.”).

⁹⁸ Australian Government, *Australia's intended nationally determined contribution to a new climate change agreement* (Aug. 2015), <http://www4.unfccc.int/Submissions/INDC/Published%20Documents/Australia/1/Australias%20Intended%20Nationally%20Determined%20Contribution%20to%20a%20new%20Climate%20Change%20Agreement%20-%20August%202015.pdf> (accessed Feb. 23, 2017).

⁹⁹ Australian Government and Queensland Government, *Reef 2050 Plan – Update on Progress*, above n. 6, page 2.

¹⁰⁰ GBRMPA, *Interim report: 2016 coral bleaching event on the Great Barrier Reef* above n. 43, page 17.

¹⁰¹ Dr. A. Finkel, K. Moses, C. Munro, T. Effeney, and M. O’Kane, *Independent Review into the Future Security of the National Electricity Market – Preliminary Report* (Dec. 2016), page 20, <http://www.environment.gov.au/system/files/resources/97a4f50c-24ac-4fe5-b3e5-5f93066543a4/files/independent-review-national-elec-market-prelim.pdf> (accessed Feb. 23, 2017). See also, J. Holman, ABC News, *Australia won't meet Paris climate change targets, urgent policy needed on emission reduction: Finkel report* (Dec. 8, 2016), <http://www.abc.net.au/news/2016-12-09/australias-energy-policy-cant-meet-current-targets/8105386> (accessed Feb. 23, 2017).

¹⁰² Australian Government Department of the Environment and Energy, *Australia's emissions projections 2016* (Dec. 2016), pages 2, 5, <https://www.environment.gov.au/system/files/resources/9437fe27-64f4-4d16-b3f1-4e03c2f7b0d7/files/aust-emissions-projections-2016.pdf> (accessed Feb. 23, 2017).

¹⁰³ *Id.*, page 8. See also, M. Slezak, *The Guardian*, *Australia's greenhouse gas emissions are rising and forecast to miss 2030 target* (Dec. 22, 2016), https://www.theguardian.com/environment/2016/dec/22/australias-greenhouse-gas-emissions-are-rising-official-figures-show?CMP=soc_567 (accessed Feb. 24, 2017).

¹⁰⁴ Climate Analytics, NewClimate Institute, Potsdam Institute for Climate Impacts Research, and Ecofys, *Australia to overshoot its 2030 target by large margin* (Aug. 2015), pages 2, 11-14, 17-21, http://climateanalytics.org/files/082015_cat_australia_indc_1.pdf (accessed Feb. 24, 2017).

¹⁰⁵ C. Hamilton and D. Karoly, *The Climate Change Authority's Special Review on Australia's Climate Goals and Policies: Towards a Climate Policy Tool Kit – Minority Report* (“Minority Report”) (Sep. 5, 2016), page 6, <http://www.climatecouncil.org.au/uploads/e11e0f33fae92ca7cc3239b91e0eb2ab.pdf> (accessed Feb. 23, 2017).

See also, Australian Government Climate Change Authority, *Reducing Australia's greenhouse gas emissions – targets and progress review – final report* (Feb. 2014), page 125, <http://www.climatechangeauthority.gov.au/files/files/Target-Progress-Review/Targets%20and%20Progress%20Review%20Final%20Report.pdf> (One of the Authority's objectives in recommending a target above Australia's NDC was to “provide guidance, based on the best available evidence, on the action likely to be required in medium term to make a fair contribution to global efforts to meet the below 2 degree goal.”); P. Canadell, A. Talberg, A. Skarbek, C. Alexander, and P. Christoff, *The Conversation*, *Australia's post-2020 climate target not enough to stop 2C warming: experts* (Aug. 11, 2015), <https://theconversation.com/australias-post-2020-climate-target-not-enough-to-stop-2c-warming-experts-45879> (both accessed Feb. 23, 2017).

¹⁰⁶ Australian Government Climate Change Authority, *Final report on Australia's future emissions reduction targets* (Jul. 2, 2015), page 6, <http://climatechangeauthority.gov.au/sites/prod.climatechangeauthority.gov.au/files/Final-report-Australias-future-emissions-reduction-targets.pdf>; Australian Government Climate Change Authority, Statement by the Chair, Mr. B. Fraser, *Some observations on Australia's Post-2020 emissions reduction target* (Aug. 14, 2015), pages 1-2,

<http://climatechangeauthority.gov.au/sites/prod.climatechangeauthority.gov.au/files/files/CFI/CCA-statement-on-Australias-2030-target.pdf>. See also, Australian Government Climate Change Authority, *Reducing Australia's greenhouse gas emissions – targets and progress review – final report*, above n. 105, pages 125-126.

¹⁰⁷ See also, Australian Government Climate Change Authority, *Reducing Australia's greenhouse gas emissions – targets and progress review – final report*, above n. 105, page 126. The targets in this report are based on 2000 levels; for updated targets based on 2005 levels, see Australian Government Climate Change Authority, *Final report on Australia's future emissions reduction targets*, above n. 106, page 6.

¹⁰⁸ Australian Government Climate Change Authority, *Reducing Australia's greenhouse gas emissions – targets and progress review – final report*, above n. 105, page 126.

¹⁰⁹ C. Hamilton and D. Karoly, *Minority Report*, above n. 105, pages 3-4. See also, C. Hamilton and D. Karoly, The Conversation, *The Climate Change Authority Report: a dissenting view* (Nov. 4, 2016), <https://theconversation.com/the-climate-change-authority-report-a-dissenting-view-64819> (accessed Feb. 24, 2017).

¹¹⁰ See Paris Equity Check, *The Science – About the Paris Equity Check Assessment*, <http://paris-equity-check.org/the-science.html>; Paris Equity Check, *Credits – Research Team*, <http://paris-equity-check.org/credits.html>; Y. Robiou du Pont, M.L. Jeffery, J. Gütschow, J. Rogelj, P. Christoff, and M. Meinshausen, “Equitable mitigation to achieve the Paris Agreement goals,” *Nature Climate Change* (Vol. 7, 38-43) (2016), page 7 (Methods), available to download at <http://www.nature.com/nclimate/journal/v7/n1/full/nclimate3186.html>; Y. Robiou du Pont, M.L. Jeffery, J. Gütschow, P. Christoff, and M. Meinshausen, “National contributions for decarbonizing the world economy in line with the G7 agreement,” *Environmental Research Letters* (Vol. 11, 2016), <http://iopscience.iop.org/article/10.1088/1748-9326/11/5/054005>; Y. Robiou du Pont, M.L. Jeffery, J. Gütschow, P. Christoff, and M. Meinshausen, “National contributions for decarbonizing the world economy in line with the G7 agreement” (Supplementary Information), *Environmental Research Letters* (Vol. 11, 2016), http://iopscience.iop.org/1748-9326/11/5/054005/media/erl054005_suppdata.pdf (all accessed Feb. 27, 2017).

¹¹¹ More information on each of the five categories of effort-sharing identified in the Paris Equity Check is available at Y. Robiou du Pont *et al.*, “Equitable mitigation to achieve the Paris Agreement goals,” above n. 110, Table 1 (page 3).

¹¹² See L. Clarke *et al.*, *Assessing Transformation Pathways* (Chapter 6), in *Climate Change 2014: Mitigation of Climate Change, Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, pages 456-462, especially Table 6.5 (page 458) and Figure 6.28 (page 460), http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter6.pdf (accessed Feb. 24, 2017).

Comparing emission allocation schemes ... is complex.... To allow comparison of substantially different proposals, Höhne *et al.* (2014) developed a categorization into seven categories based on three equity principles: responsibility, capability, and equality. The first three categories represent these equity principles alone. The following three categories represent combinations of these principles. “Equal cumulative per capita emissions” combines equality (per capita) with responsibility (cumulative accounting for historical emissions); “responsibility, capability, and need” includes approaches that put high emphasis on historical responsibility and at the same time on capability plus the need for sustainable development; “staged approaches” includes those that already constitute a compromise over several principles. Finally, the last category, “equal marginal abatement costs” (implemented in the models as uniform carbon tax with no compensatory transfers), represents the initial allocation to that which would emerge from a global price on carbon. This is used as a reference against which to compare the implications of other regimes.

Id., pages 457-458.

¹¹³ See Paris Equity Check, *Equity Map*, <http://paris-equity-check.org/> (accessed Feb. 27, 2017). Both of the types of equity assessment that Australia's target is consistent with for the 2°C goal have been critiqued, respectively, as

unfair, and as relying on business-as-usual projections which allows countries to claim high projections to reduce mitigation efforts. See Robiou du Pont *et al.*, “Equitable mitigation to achieve the Paris Agreement goals,” above n. 110, page 4 (“The fairness of the [constant emissions ratio equity assessment], or ‘grandfathering,’ approach is criticized in the literature and is not supported as such by any Party.”); Y. Robiou du Pont *et al.*, “National contributions for decarbonizing the world economy in line with the G7 agreement” (Supplementary Information), above n. 110, page 20; M. Meinshausen *et al.*, “National post-2020 greenhouse gas targets and diversity-aware leadership – Supplementary Information,” *Nature Climate Change* (Vol 5, 2015), page 30, <http://www.nature.com/nclimate/journal/v5/n12/extref/nclimate2826-s1.pdf> (accessed Feb. 28, 2017) (In relation to the greenhouse development rights equity assessment, “there is an intrinsic incentive for every country to inflate” their projected emissions).

¹¹⁴ See Paris Equity Check, *Equity Map*, above n. 113. Specifically in relation to the equity assessments of constant emissions ratio and greenhouse development rights, although the Paris Equity Check indicates that Australia’s NDC does not meet these categories, it is within the potential range identified for these categories but is less ambitious than the average of the range. Therefore, the authors conclude that Australia’s NDC is not consistent with those categories.

¹¹⁵ Climate Action Tracker (“CAT”), *Australia*, <http://climateactiontracker.org/countries/australia.html> (accessed Feb. 23, 2017). The CAT describes its methodology as follows: “In our Effort Sharing assessment, we have compiled a wide range of literature on what researchers would consider a ‘fair’ contribution to greenhouse gas reductions. The “effort-sharing” studies in the CAT’s database include over 40 studies used by the [Intergovernmental Panel on Climate Change] ... plus additional analyses the CAT has performed to complete the dataset. They cover very different viewpoints of what could be fair, including considerations of equity, including historical responsibility, capability, and equality. We only include those results from studies that are compatible with the 2°C limit.” Climate Action Tracker, *Comparability of effort*, <http://climateactiontracker.org/methodology/85/Comparability-of-effort.html> (accessed Feb. 23, 2017). For more information about the IPCC’s effort-sharing approach, see L. Clarke *et al.*, *Assessing Transformation Pathways*, above n. 112, Table 6.5 (page 458). See also, Climate Analytics, *Australia set to overshoot its 2030 target by large margin*, <http://climateanalytics.org/latest/australia-set-to-overshoot-its-2030-target-by-large-margin> (accessed Feb. 23, 2017).

¹¹⁶ Climate Equity Reference Calculator, *Country/region report in 2030 for Australia*, https://calculator.climateequityreference.org/?cum_since_yr=1950&use_lulucf=1&use_netexports=0&use_nonco2=1&emergency_path=14&emergency_program_start=2012&baseline=default_gdrs&percent_gwp=&percent_gwp MITIGATION=1&percent_gwp ADAPTATION=1&use_sequencing=0&percent_a1_rdxn=40&base_levels_yr=1990&end_commitment_period=2020&a1_smoothing=2&mit_gap_borne=2&use_mit_lag=1&em_elast=1&dev_thresh=7500&lux_thresh=50000&interp_btwn_thresh=0&r_wt=0.5&do_luxcap=0&luxcap_mult=1&use_kab=0&kab_only_ratified=0&dataversion=7.0.0dev&iso3=AUS (accessed February 23, 2017). For a discussion of the Climate Equity Reference Calculator’s methodology, see Climate Equity Reference Project, *About the Climate Equity Reference Project Effort-sharing Approach*, <https://climateequityreference.org/about-the-climate-equity-reference-project-effort-sharing-approach/>; Climate Equity Reference Project, *About the Climate Equity Reference Project*, <https://climateequityreference.org/> (both accessed Feb. 23, 2017).

¹¹⁷ O. Hoegh-Guldberg, *The current and future impacts of climate change and ocean acidification on the Great Barrier Reef* (report prepared for an objections hearing in the Land Court of Queensland regarding the proposed Carmichael Coal Mine) (Feb. 6, 2015), para. 52, <http://envlaw.com.au/wp-content/uploads/carmichael17.pdf> (accessed Feb. 23, 2017).

¹¹⁸ See, e.g., Queensland Government, Minister for State Development and Minister for Natural Resources and Mines The Honourable Anthony Lynham, *Queensland Government steps up to progress Adani mine project* (Oct. 9, 2016), <http://statements.qld.gov.au/Statement/2016/10/9/queensland-government-steps-up-to-progress-adani-mine-project>; The Guardian, *Scott Morrison brings a chunk of coal into parliament – video* (Feb. 8, 2017), <https://www.theguardian.com/global/video/2017/feb/09/scott-morrison-brings-a-chunk-of-coal-into-parliament-video>; Senator the Honourable Matt Canavan, *Canavan welcomes Adani’s regional commitment* (Dec. 6, 2016), <http://www.minister.industry.gov.au/ministers/canavan/media-releases/canavan-welcomes-adanis-regional>

[commitment](https://www.nytimes.com/2016/11/15/opinion/australias-addiction-to-coal.html); R. Denniss, The New York Times, *Australia's addiction to coal* (Nov. 14, 2016), <https://www.nytimes.com/2016/11/15/opinion/australias-addiction-to-coal.html> (all accessed Feb. 24, 2017).

¹¹⁹ See, e.g., Adani, *Carmichael Coal Mine and Rail Project – Environmental Impact Statement – Executive Summary*, page (E-i),

<http://eisdocs.dsdip.qld.gov.au/Carmichael%20Coal%20Mine%20and%20Rail/EIS/EIS/Project%20Wide/executive-summary-project-wide.pdf>; A. Horn, ABC News, *Here's what we know about Adani and the Carmichael mine project* (Dec. 5, 2016), <http://www.abc.net.au/news/2016-12-05/what-we-know-about-adani-and-the-carmichael-mine-project/8094244> (both accessed Feb. 24, 2017).

¹²⁰ Australian Government, Geoscience Australia, *Australian Energy Resource Assessment* (2nd ed., 2014), page 149, https://d28rz98at9flks.cloudfront.net/79675/79675_AERA.pdf (accessed Feb. 14, 2017). Those mines are the Alpha Coal Project, Carmichael Coal Mine and Rail Project, Galilee Coal Project (Northern Export Facility), Kevin's Corner Project, South Galilee Coal Project, and China Stone Coal Project: see generally, Queensland Government, Department of State Development, *Alpha Coal Project*, <http://statedevelopment.qld.gov.au/assessments-and-approvals/alpha-coal-project.html>; *Carmichael Coal Mine and Rail Project*, <http://statedevelopment.qld.gov.au/assessments-and-approvals/carmichael-coal-mine-and-rail-project.html>; *Galilee Coal Project (Northern Export Facility)*, <http://statedevelopment.qld.gov.au/assessments-and-approvals/galilee-coal-project.html>; *Kevin's Corner Project*, <http://statedevelopment.qld.gov.au/assessments-and-approvals/kevin-s-corner-project.html>; *South Galilee Coal Project*, <http://statedevelopment.qld.gov.au/assessments-and-approvals/south-galilee-coal-project.html>; and *China Stone Coal Project*, <http://statedevelopment.qld.gov.au/assessments-and-approvals/china-stone-coal-project.html> (all accessed Feb. 17, 2017).

¹²¹ The methodology below was used to reach this figure. The saleable coal from the six mines in the Galilee Basin is 8,895 Mt. This calculation is based on the annual saleable coal from each mine multiplied by its years of operation: Carmichael Mine: 60 Mt/yr x 60 years = 3,600 Mt; Alpha Mine: 30 Mt/yr x 30 years = 900 Mt; Kevin's Corner Mine: 30 Mt/yr x 30 years = 900 Mt; Galilee Coal Project (Northern Export Facility): 40 Mt/yr x 25 years = 1,000 Mt; South Galilee Mine: 17 Mt/yr x 35 years = 595 Mt; China Stone Mine: 38 Mt/yr x 50 years = 1,900 Mt. The total for the six mines is 8,895 MT of coal. The volume of saleable coal and years of operation of each mine was obtained from the Queensland Coordinator General's evaluation reports of the environmental impact statements for all of the mines other than the China Stone project (the calculation for which was based on the draft environmental impact statement released by the proponent in 2015, as the project has not yet been approved). See footnote 120 above for links to these documents. Each ton of coal burned emits about approximately 2.38 tons of CO₂e (see B. Parris, The Conversation, *Expanding coal exports is bad news for Australia and the world* (Sep. 12, 2013), <https://theconversation.com/expanding-coal-exports-is-bad-news-for-australia-and-the-world-17937>). 8,895 Mt of coal x 2.38 tons of CO₂e = 21.17 GtCO₂e.

The Intergovernmental Panel on Climate Change's Fifth Assessment Report estimated that, as at 2011, the remaining carbon that can be emitted for a 66% likelihood of remaining under 2°C of post-industrial warming is 750 to 1,400 GtCO₂. See Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report – Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2014), Table 2.2 (page 64), Simple model, WGIII scenarios, https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf. Given current global emissions of about 40 GtCO₂e (see CO₂.earth, *Global Carbon Emissions*, <https://www.co2.earth/global-co2-emissions>), the estimated remaining carbon budget as of 2017 is 510 to 1,160 GtCO₂e. As such, the emissions from burning the saleable coal in the six Galilee Basin mines (21.17 GtCO₂e) is 1.83% to 4.15% of the carbon budget and 2.55% of the average budget range of 835GtCO₂e.

The Global Carbon Project, a partnership between a number of scientific organizations, estimates that the remaining carbon budget at 2017 for a 66% chance of limiting warming to 2°C is only 800 GtCO₂e. Using this budget, the emissions from burning the saleable coal from the Galilee Basin mines constitute 2.65% of the budget. See Global Carbon Project, *Global Carbon Budget 2016* (Nov. 14, 2016), pages 49-50, http://www.globalcarbonproject.org/carbonbudget/16/files/GCP_CarbonBudget_2016.pdf. (All webpages

accessed Feb. 24, 2017.) For a discussion of carbon budgets generally, see J. Rogelj, M. Schaeffer, P. Friedlingstein, N.P. Gillett, D.P. van Vuuren, K. Riahi, M. Allen, and R Knutti, “Difference between carbon budget estimates unravelled,” *Nature Climate Change* (Vol. 6, March 2016), pages 245-242.

¹²² State of Queensland, Department of State Development, Infrastructure and Planning, *Carmichael Coal Mine and Rail project: Coordinator-General’s evaluation report on the environmental impact statement* (May 2014), pages 2, 10, <http://statedevelopment.qld.gov.au/resources/project/carmichael/carmichael-coal-mine-and-rail-cg-report-may2014.pdf> (accessed Feb. 21, 2017).

¹²³ Dr. C. Taylor, and M. Meinshausen, *Joint Report to the Land Court of Queensland on “Climate Change – Emissions”* (Dec. 22, 2014), para. 17, filed in *Adani Mining Pty Ltd v Land Services of Coast and Country Inc. & Ors*, <http://envlaw.com.au/wp-content/uploads/carmichael14.pdf>; *Adani Mining Pty Ltd v Land Services of Coast and Country Inc & Ors* [2015] QLC 48 (Dec. 15, 2015), paras. 433-436, <http://archive.sclqld.org.au/qjudgment/2015/QLC15-048.pdf> (both accessed Feb. 21, 2017).

¹²⁴ C. Amos and T. Swann, The Australia Institute, *Carmichael in context: quantifying Australia’s threat to climate action* (Nov. 2015), pages (i), 4, 5, 7, 8, <http://www.tai.org.au/sites/default/files/Amos%202015%20Carmichael%20in%20context%20-.pdf> (accessed Feb. 21, 2017).

¹²⁵ D. Tarte *et al.*, *Reef 2050 Long-Term Sustainability Plan – Progress on Implementation – Review by the Great Barrier Reef Independent Review Group*, above n. 33, page 40 (“New coal mines pose a serious threat to the [Great Barrier Reef World Heritage Area].”).

¹²⁶ O. Hoegh-Guldberg, *The current and future impacts of climate change and ocean acidification on the Great Barrier Reef*, above n. 118, paras. 49, 52 (emphasis added).

¹²⁷ A. Grech *et al.*, *Coal, Cumulative Impacts, and the Great Barrier Reef*, above n. 82, page 200. See also, B. Pressey, A. Grech, J.C. Day, M. Sheaves, The Conversation, *Development and the Reef: the rules have been lax for too long* (May 28, 2015), <http://theconversation.com/development-and-the-reef-the-rules-have-been-lax-for-too-long-39383> (“[G]overnments need to use the best available methods to assess cumulative impacts on the Reef as a result of changes in land and water use, coastal planning decisions, and the future demands for coal, sugar cane, tourism or other products. We have the ability to model the effects of all these factors on the Reef, using the best available data and expert opinion.”); J.C. Day, B. Pressey, J. Brodie, and T. Hughes, The Conversation, *The plan to save the Great Barrier Reef is destined to fail unless...* (Oct. 28, 2014), <https://theconversation.com/the-plan-to-save-the-great-barrier-reef-is-destined-to-fail-unless-33542> (both accessed Feb. 20, 2017) (“[The Reef 2050 Plan] provides no practical guidance regarding cumulative impacts which are currently poorly understood and assessed. The plan does little to constrain more dredging, coastal development or fossil fuel extraction (effectively ‘business-as-usual’), all of which will be superimposed on the current pressures, continuing the implicit policy of ‘death by a thousand cuts.’”).

¹²⁸ See generally, Adani, *Carmichael Mine & Rail Project – Environmental Impact Statement*, http://www.adaniaustralia.com/wps/portal/businesses/carmichael-coal-mine-and-rail-project!/ut/p/z1/04_Sj9CPyKssy0xPLMnMz0vMAfIjo8ziPYx83A0MLQx8DJxcDQ0cQ43cLQNd_QzdvU30wwkpiAJKG-AAjgZA_VFgJThMCLAwHyAY0ZBboRBpqOIlgB4AZNA/#environTab2 (accessed Feb. 21, 2017).

¹²⁹ See, e.g., State of Queensland, Department of State Development, Infrastructure and Planning, *Carmichael Coal Mine and Rail project: Coordinator-General’s evaluation report on the environmental impact statement*, above n. 123, pages 218, 221.

¹³⁰ A. Grech *et al.*, *Coal, Cumulative Impacts, and the Great Barrier Reef*, above n. 82, pages 203-204.

¹³¹ *Id.*, page 203.

¹³² See generally, Australian Government and Queensland Government, *Reef 2050 Long-Term Sustainability Plan* (2015), <https://www.environment.gov.au/system/files/resources/d98b3e53-146b-4b9c-a84a-2a22454b9a83/files/reef-2050-long-term-sustainability-plan.pdf> (accessed Feb. 21, 2017).

¹³³ Australian Government and Queensland Government, *Reef 2050 Plan – Annual report and implementation strategy* (2016), <https://www.environment.gov.au/system/files/resources/e2b70193-91fa-49e6-95b2-b1aa8adb1d7c/files/annual-report-imp-plan-reef-2050-plan.pdf> (accessed Feb. 21, 2017); Australian Government and Queensland Government, *Reef 2050 Plan – Update on Progress*, above n. 6.

¹³⁴ See, e.g., Australian Government and Queensland Government, *Reef 2050 Long-Term Sustainability Plan*, above n. 133, pages 22-23.

¹³⁵ J.C. Day, A. Grech, and J. Brodie, *The Conversation, Great Barrier Reef needs far more help than Australian claims in its latest report to UNESCO* (Dec. 5, 2016), <https://theconversation.com/great-barrier-reef-needs-far-more-help-than-australia-claims-in-its-latest-report-to-unesco-69882> (“The worst-known bleaching event in the Great Barrier Reef demonstrates the limitations of the Reef 2050 Plan, which is silent on the impact of greenhouse emissions from Queensland’s coal mines and the effects of climate change more generally.”); W. Steffen, *Enough PR spin: we need a real plan for the Reef that includes ditching coal* (Nov. 24, 2016), <http://www.smh.com.au/comment/to-save-the-great-barrier-reef-we-must-phase-out-fossil-fuels--and-fast-20161123-gsvq72.html> (“The government approach so far has been to highlight the global effort to tackle climate change, without even a smidgen of irony about the fact that Australia has lagged far behind the efforts of other wealthy nations.”); A. Grech et al., *Coal, Cumulative Impacts, and the Great Barrier Reef*, above n. 82, page 203 (The Reef 2050 Plan is “silent on the impact of greenhouse emissions from energy production and the effects of climate change more generally.”) (both accessed Feb. 19, 2017).

¹³⁶ GBRMPA, *2014 Outlook Report*, above n. 7, pages 266.

¹³⁷ This project is called the Abbot Point Growth Gateway Project. See generally, Queensland Government, Department of State Development, *Abbot Point Growth Gateway Project*, <https://www.statedevelopment.qld.gov.au/major-projects/abbot-point-growth-gateway-project.html>; Australian Government Department of the Environment, *Abbot Point Growth Gateway Project, Queensland (EPBC 2015/7467)* (Dec. 21, 2015), <http://epbcnotices.environment.gov.au/entity/annotation/2f828db4-2fa8-e511-9621-005056ba00a7/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1487730043188> (both accessed Feb. 21, 2017).

¹³⁸ Queensland Government, *Abbot Point Growth Gateway Project – Environmental Impact Statement – Volume 2 (‘Abbot Point EIS Volume 2’)* (Aug. 17, 2015), pages 1, 5,

<https://www.statedevelopment.qld.gov.au/resources/project/abbot-point-apx/abbot-pt-eis-vol-02-main-report.pdf>; Australian Government, Department of the Environment, *Abbot Point Coal Terminal, Port of Abbot Point, Queensland (EPBC 2011/6194)* (Dec. 10, 2013), <http://epbcnotices.environment.gov.au/entity/annotation/4a0004eb-3068-e511-9099-005056ba00a8/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1487784379812>; Adani, *Adani Abbot Point Terminal 0*, <http://www.adaniaustralia.com/businesses/adani-abbot-point-terminal-0> (all accessed Feb. 22, 2017).

¹³⁹ Queensland Government, *Abbot Point EIS Volume 2*, above n. 139, pages 5, 34.

¹⁴⁰ A. Horn and E. Ford, ABC News, *Abbot Point: federal government approves huge coal port expansion near Great Barrier Reef* (Dec. 22, 2015), <http://www.abc.net.au/news/2015-12-22/massive-abbot-point-coal-port-expansion-gets-federal-approval/7047380> (accessed Feb. 22, 2017).

¹⁴¹ Adani, *Terminal 0 Environmental Impact Statement – Section 1 General Information (‘Terminal 0 EIS’)* (2013), pages 4, 20, available to download at http://www.adaniaustralia.com/wps/portal/businesses/adani-abbot-point-terminal-0/lut/p/z1/hY7NDolwEISfhQNXdsE_9FYTgJGE6MGlezFgasEUSkqF17dRLyaic9udbyYDBBIQk_eVYe2lmlza-OTz8yZiYvRDTHAd-cgOQbzC6kfpFM4_gPI2jgihjZPT2SKYRcu3sCPj2QkKp4zWVNMqkFkOZXrrn27tq-S2PabuWii8MweEiplbI3UbWL3yKl6gxknyS0dYa3mewT5jgP7HCIZA!/#portEnvironTab2 (accessed Feb. 22, 2017). See also, Queensland Government, *Abbot Point EIS Volume 2*, above n. 139, page 34, 458; North Queensland Bulk Ports Corporation, *Port of Abbot Point*, <http://www.ngbp.com.au/abbot-point/> (accessed Feb. 22, 2017).

¹⁴² Queensland Government, *Abbot Point EIS Volume 2*, above n. 139, pages 1, 39-58.

¹⁴³ Adani, *Terminal 0 EIS*, above n. 142, page 20.

¹⁴⁴ Queensland Government, *Abbot Point EIS Volume 2*, above n. 139, pages 39, 385.

¹⁴⁵ *Id.*, pages 446, 554.

¹⁴⁶ Dr. K. McMahon, *Attachment 3: Expert advice from Dr Kathryn McMahon, Centre for Marine Ecosystems Research, Edith Cowan University*, in Australian Marine Conservation Society and WWF-Australia, *Comments on the Environmental Impact Statement for the Abbot Point Growth Gateway Project (EPBC 2015/7467)* (Sep. 18, 2015).

¹⁴⁷ Commonwealth of Australia, *Synthesis of current knowledge of the biophysical impacts of dredging and disposal on the Great Barrier Reef* (March 2015), page 3,

<https://research.jcu.edu.au/tropwater/resources/DredgeSynthesisPanelReportMar15.pdf> (accessed Feb. 21, 2017).

¹⁴⁸ UNESCO, *Great Barrier Reef*, above n. 19.

¹⁴⁹ GBRMPA, *Strategic Assessment Report*, above n. 11, pages 7-6, 7-10, 7-15, 7-16.

¹⁵⁰ Queensland Government, *Abbot Point EIS Volume 2*, above n. 139, page 445. See also, *id.*, pages 446, 554.

¹⁵¹ *Id.*, pages 445, 446, 448-451.

¹⁵² *Id.*, pages 475-482; see also, GBRMPA, *2014 Outlook Report*, above n. 7, pages 137-138, 178-179.

¹⁵³ Queensland Government, *EIS Volume 2*, above n. 139, pages 474-475.

¹⁵⁴ *Id.*, page 469.

¹⁵⁵ *Id.*, pages 475-482.

¹⁵⁶ T. Moore, *Brisbane Times*, *Oil spilled in QLD ports with 'alarming regularity* (Jan. 20, 2016),

<http://www.brisbanetimes.com.au/queensland/oil-spills-could-be-ecologically-disastrous-maritime-safety-ql-20160119-gm9c6s.html#ixzz3xjbEN4io> (accessed Feb. 21, 2017).

¹⁵⁷ See generally, Queensland Government, *Abbot Point EIS Volume 2*, above n. 139, pages 185-208. For example, in relation to the impact of the project on Australian snubfin and Indo-Pacific humpback dolphins, the populations of which are extremely vulnerable, the environmental impact study stated, "It is not known whether the study area supports breeding individuals as no calves or breeding behaviour has been observed in the area, and it is not known if the dolphins observed are residents, or only transients that occasionally use the area.... The lack of regional and national population data for both species makes it difficult to understand the importance of the population of Australian Snubfin and Indo-Pacific Dolphins in a broader context." *Id.*, pages 186, 187, 196. In relation to the impacts on dugongs, another extremely vulnerable species, the environmental impact study relied on outdated data from 2007-2009 to conclude the area was of low conservation importance for dugongs, despite Abbot Point being located between two dugong protection areas. *Id.*, pages 187, 197, 198. See also, Australian Marine Conservation Society and WWF-Australia, *Comments on the Environmental Impact Statement for the Abbot Point Growth Gateway Project (EPBC 2015/7467)*, above n. 147.

¹⁵⁸ Australian Academy of Science, *Reef 2050 Long Term Sustainability Plan – Position Statement* (Apr. 1, 2015), <https://www.science.org.au/supporting-science/science-policy/position-statements/reef-2050-long-term> (accessed Feb. 19, 2017).

¹⁵⁹ J. C. Day, *The Conversation*, *Six ways Australia is selectively reporting to the UN on the Great Barrier Reef*, (Feb. 4, 2015), <http://theconversation.com/six-ways-australia-is-selectively-reporting-to-the-un-on-the-great-barrier-reef-37161> (accessed Feb. 19, 2017) ("While the draft Reef 2050 Plan has some targets, most are not clearly defined and few, if any, are scientifically justified."). This failure is contrary to the recommendations of the World Heritage Committee: see World Heritage Committee, 36 COM 7B.8 (2012), <http://whc.unesco.org/en/soc/86>, para. 8 (accessed Feb. 28, 2017) ("The World Heritage Committee ... [r]ecommends [Australia] ... develop and adopt clearly defined and scientifically justified targets for improving its state of conservation and enhancing its resilience..."). See also, B. Pressey *et al.*, *Development and the Reef: the rules have been lax for too long*, above n. 128 (In the Reef 2050, "targets for ecosystem health and biodiversity ... are general and qualitative, making achievement subject to argument. Enhancements to management of coastal land-use change are described using terms such as 'add to', 'require', 'strengthen', and 'ensure' – vaguely encouraging, but essentially lacking in specific commitment."); Australian Academy of Science, *Response to the Draft Reef 2050 Long-Term Sustainability Plan* (Oct. 2014), page 2, <https://www.science.org.au/files/userfiles/support/position-statements/response-to-the-draft-reef-2050-long-term-sustainability-plan.pdf> ("[M]any important targets are not quantified, nor are they connected to any mechanisms through which they can be achieved.") (accessed Feb. 19, 2017).

¹⁶⁰ J.C. Day *et al.*, *Great Barrier Reef needs far more help than Australian claims in its latest report to UNESCO*, above n. 136.

¹⁶¹ Australian Network of Environmental Defender's Offices, *Submission on the Reef 2050 Long Term Sustainability Plan* (Oct. 27, 2014), page 4, <http://www.edoql.org.au/wp-content/uploads/2014/10/2014-10-27-ANEDO-submission-on-the-reef-2050-plan1.pdf> (accessed Feb. 19, 2017).

¹⁶² Australian Academy of Science, *Reef 2050 Long Term Sustainability Plan – Position Statement*, above n. 159; J. C. Day, *Six ways Australia is selectively reporting to the UN on the Great Barrier Reef*, above n. 160.

¹⁶³ Australian Academy of Science, *Reef 2050 Long Term Sustainability Plan – Position Statement*, above n. 159 (“The 2050 Plan places no restriction on the volume or disposal of maintenance dredge spoil. Maintenance dredge spoil can have even greater impacts than capital dredge spoil through re-suspension of much finer sediments.”).

¹⁶⁴ *Id.*; J.C. Day, *Six ways Australia is selectively reporting to the UN on the Great Barrier Reef*, above n. 160.

¹⁶⁵ J.C. Day et al., *Great Barrier Reef needs far more help than Australian claims in its latest report to UNESCO*, above n. 136.

¹⁶⁶ WWF-Australia and the Australian Marine Conservation Society, *Reef Probation Report – The Australian and Queensland governments made a promise to the World Heritage Committee to protect the Great Barrier Reef... How well have they performed?* (Nov. 2016), pages 12, 13, <http://www.wwf.org.au/ArticleDocuments/353/pub-reef-probation-report-24nov16.pdf.aspx?Embed=Y> (accessed Feb. 19, 2017).

¹⁶⁷ *Id.*, pages 14-19.

¹⁶⁸ D. Tarte et al., *Reef 2050 Long-Term Sustainability Plan – Progress on Implementation – Review by the Great Barrier Reef Independent Review Group*, above n. 33, pages 6, 7, 11-30.

¹⁶⁹ See generally, WWF-Australia and the Australian Marine Conservation Society, *Reef Probation Report*, above n. 167.

¹⁷⁰ See Earthjustice and Environmental Justice Australia, *Protecting the Great Barrier Reef: A legal assessment of the World Heritage Committee’s draft decision concerning the potential inscription of the Great Barrier Reef on the List of World Heritage in Danger*, above n. 23.

