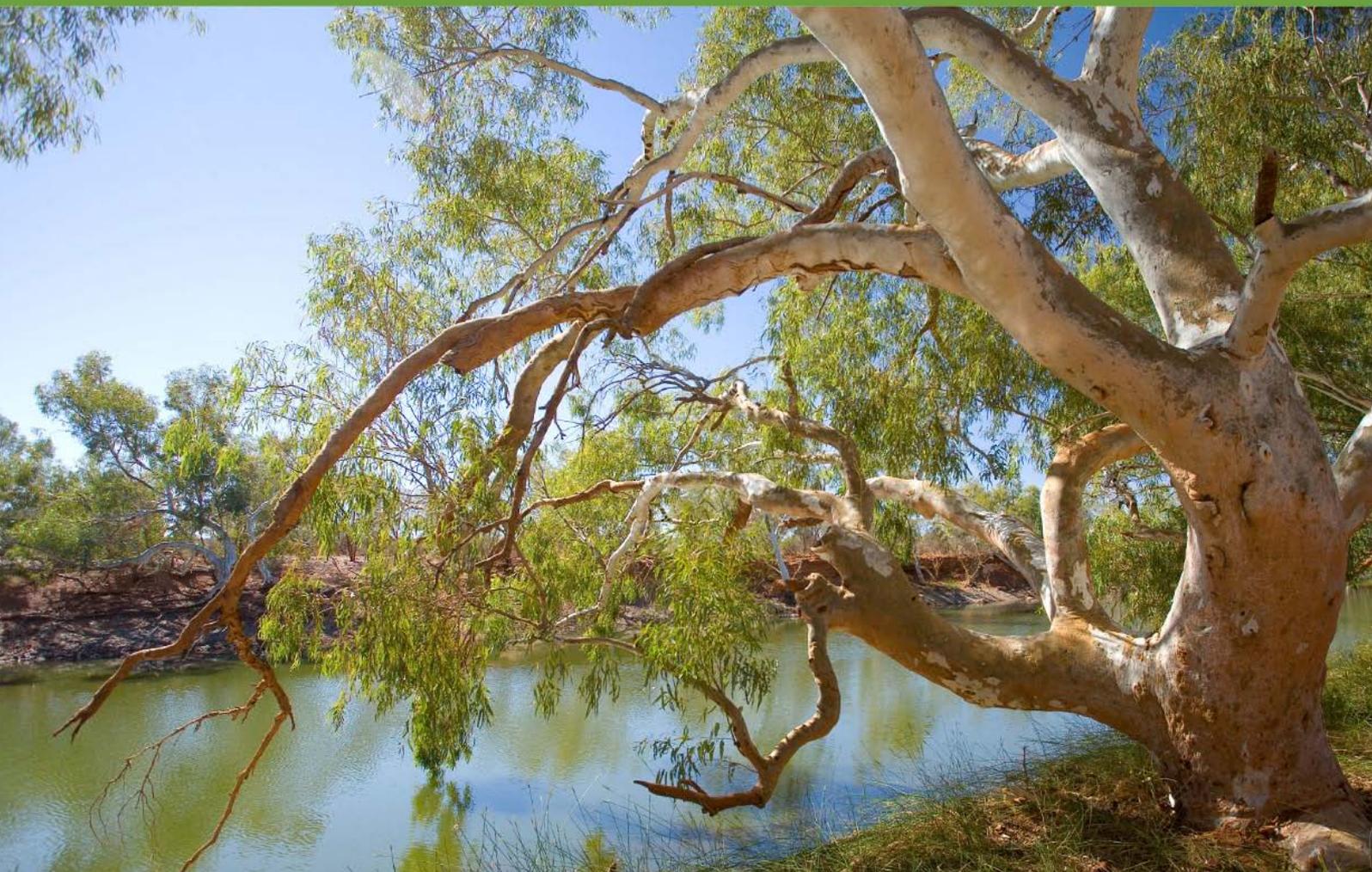


# Peer review of the Australia State of the Environment 2011 report

DECEMBER 2011

PRODUCED BY the Department of Sustainability, Environment, Water, Population and Communities  
ON BEHALF OF the State of the Environment 2011 Committee



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## **Cover image**

Cattle Pool, Mount Augustus National Park, WA  
Photo by Nick Rains

## **Preface**

This report was developed by the Department of Sustainability, Environment, Water, Population and Communities to help inform the Australia State of the Environment (SoE) 2011 report.

The Minister for Environment is required, under the *Environment Protection and Biodiversity Conservation Act 1999*, to table a report in Parliament every five years on the State of the Environment.

The Australia State of the Environment (SoE) 2011 report is a substantive, hardcopy report compiled by an independent committee appointed by the Minister for Environment. The report is an assessment of the current condition of the Australian environment, the pressures on it and the drivers of those pressures. It details management initiatives in place to address environmental concerns and the effectiveness of those initiatives.

The main purpose of SoE 2011 is to provide relevant and useful information on environmental issues to the public and decision-makers, in order to raise awareness and support more informed environmental management decisions that lead to more sustainable use and effective conservation of environmental assets.

The 2011 SoE report, commissioned technical reports and other supplementary products are available online at [www.environment.gov.au/soe](http://www.environment.gov.au/soe).

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## **Peer review of the Australia State of the Environment 2011 report**

### ***Purpose***

This supplementary report outlines the principles and processes relating to how peer review of the draft 2011 State of the Environment (SoE) report was conducted. It provides information on the key issues that were raised by each reviewer of each draft chapter, and how this feedback was incorporated by the authors into improving the final report.

### ***Introduction***

Peer review, or refereeing, is the process by which a scholarly product is examined with a view to improving its scientific credibility and reliability. Reviews are typically conducted by qualified professionals with experience in the same discipline, and are able to provide impartial feedback. An independent, transparent and rigorous peer review process allows readers to have greater confidence in the quality of those materials.

### ***Approach to peer review of the Australia SoE 2011 report***

The aim of the external peer review process for the main SoE report was to obtain constructive advice that validated and strengthened the content. Aside from the authors and other contributors, the people best placed to provide suggestions for improving the chapters were the external peer reviewers. Peer reviewers for each of the chapters of SoE 2011 were selected based on their relevant expertise in particular fields, and the need to review the full breadth of content in each chapter. Because of the wide scope of each chapter, and because the specific experience of an individual reviewer varies, each chapter was reviewed by three to five experts. This resulted in a total of 36 external peer reviewers of the draft report, including three that reviewed two chapters.

To encourage more rigorous and objective feedback, peer reviewers were commissioned, independent, and anonymous, so that the identities of reviewers and author(s) were not revealed to either party. Furthermore, the identity of each reviewer was not revealed to any other. To accomplish this, the peer review process was managed by DSEWPaC. To maintain anonymity, any communication between author and reviewer, such as clarification of particular points, was also conducted through DSEWPaC.

### ***Terms of reference for peer reviewers***

Referees were asked to review within the following guidelines:

The peer reviewer should examine the product with the aim of improving its quality and credibility, focusing comments on:

- assertions that contradict published data, general scientific understanding or other evidence
- unfounded assertions
- conclusions drawn from the selective use or representation of data, where more objective or balanced reporting of the data would show a different conclusion
- omission of relevant data or important issues that would significantly improve the material

- illogical statements or conclusions, and
- other suggestions for improving the quality and credibility of the product

The author(s) also provided additional, chapter-specific terms of reference in cases where they wanted to bring specific content to the reviewers' attention and invite more focused suggestions in those areas. As professional editors were already engaged for the whole report, peer reviewers were not required to perform an editorial role such as correcting grammatical or typographic errors. They were, however, encouraged to bring to the author's attention text which required clarification or editing to improve understanding of the main issue(s) or content.

### ***Processing and responding to peer reviewers' comments***

Reviewers were provided with a template in which to organise their feedback. At the completion of the review period of two weeks, each peer reviewer was required to provide to DSEWPaC a written report that comprised the completed template with all comments and suggestions relating to the whole chapter, with justifications as appropriate, including a condensed, dot point summary of key issues. This document was forwarded to the chapter author(s) after removing any identifying information. Without exception, all reviewer comments were passed on to the author(s). As in most instances where peer review is used, authors of the SoE report were not obligated to accept each recommendation from each reviewer. The authors were, however, required to consider and respond to all individual comments, indicating whether or not a change was made and providing justification as appropriate.

Comments on individual chapters focused on discussion and comprehensiveness of main issues, omissions of specific data, logic and clarity of text, figures and tables, as well as adequacy and appropriateness of sources and references. Generally, each reviewer of the same chapter focused on different aspects of the content, with few instances of overlap. This underlined the importance of having multiple reviewers of each chapter. Suggestions from reviewers were incorporated into the report to strengthen content and also to identify areas that required additional explanation.

Generally, peer reviewers are not informed as to what extent their feedback was incorporated into a finalised document. However, in the case of SoE 2011, the completed set of comments and responses was returned to the corresponding reviewer, and each reviewer also received a copy of this peer review summary report, to help provide a context for their own feedback in the light of other reviews of that chapter and those of other chapters. All peer reviewers of the chapters and supplementary products are acknowledged in the Appendix to the main report.

**Summary of reviewers’ comments and authors’ responses for each thematic chapter**

As stated above, the purpose of this report is to provide information on the key issues that were raised by each peer reviewer of each draft chapter, and how this feedback was incorporated by the authors into improving the final report. Much of the remainder of this report therefore comprises the dot point summary from each reviewer and accompanying responses by the author(s). Summaries are grouped for each thematic chapter, and chapters follow the same arrangement as those in the main report. To preserve anonymity, names are not attributed to any text.

<b>Drivers</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• This is an excellent chapter and my comments are relatively minor and peripheral except in the Population Topic.</li> <li>• I have concerns of the 2050 outlook for the population projections. We really only have a measure of comfort in going up to 2030.</li> <li>• The discussion on spatial differences in the interrelationship of drivers with climate change is limited in line with the amount of evidence and study of it.</li> <li>• In the discussion of population it may have been relevant to talk about the emerging drivers of international migration. These include the ageing of the population, climate change internationally, the growing interdependence of economies etc.</li> <li>• There is a need to include a consideration of social drivers.</li> </ul>	<ul style="list-style-type: none"> <li>• Noted.</li> <li>• Agreed, but population projections are available out to 2050 and this allows us to compliment the climate projections for this same period. The Chapter acknowledges the policy and scientific uncertainties associated with projections this far into the future.</li> <li>• True, although subsequent Theme chapters do endeavor to translate these broad drivers into more regional implications for the environment where possible.</li> <li>• An understandable connection, but beyond the scope of this Report.</li> <li>• The social drivers of change in how we use or protect the environment are important but generally beyond the scope of this report. However, one major socio-political trend (the growing importance of indigenous ownership and management of the environment) is featured throughout the Report.</li> </ul>

Reviewer #2 - key points	Author response
<ul style="list-style-type: none"> <li>• The Report has identified climate change as a fundamental driver of future environmental change, with a significant increase in emphasis compared to the SoE 2006 report. While this emphasis is commendable and appropriate, climate change should be viewed as an <i>additional</i> stress on top of existing stresses on Australia’s ecosystems and biodiversity. A future focus on climate change impacts is certainly appropriate, but should not diminish the importance of dealing with long-term stresses such as land clearing and invasive species. It is certainly the case that if Australia’s environment had not been allowed to deteriorate to the extent that it has, our biodiversity would have far greater resilience to the new threat of climate change.</li> <li>• Climate change should force a new way of thinking about environmental management and conservation. I hope that this is emphasized in other sections of the report.</li> <li>• Population and economic growth are also identified as key drivers of environmental change and the challenge of decoupling these drivers from further environmental degradation is rightly identified as critical. However, the chapter gives no hint as to how this decoupling might be done, so I trust that later chapters will contain concrete and measurable strategies.</li> </ul>	<ul style="list-style-type: none"> <li>• Agreed. The SOE 2011 report is choosing to highlight a few major drivers in this chapter; subsequent Theme chapters translate these into relevant impacts including a more complete set as anticipated by the Reviewer.</li> <li>• Agreed. The implications of climate change are profound yet not fully understood. This “unmanaged” risk is a feature in the assessments of all of the Themes in the Report.</li> <li>• Subsequent chapters do, to some extent, foreshadow or identify how climate change impact or risk might be lessened. It is our hope that we offer enough examples of local success or policy innovation to at least offer some credible hope in this regard. However, the identification of the diverse paths by which we can decouple the environment from our economic growth is beyond the scope of the SOE 2011 Report.</li> </ul>
Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>• This chapter lacks a convincing analytical framework for analysing drivers of change of Australia’s environmental assets (land, water, air, biodiversity).</li> <li>• As a consequence, the analysis remains simplistic and mostly presents well known facts that could easily be found elsewhere. The chapter ignores important drivers including demographics; production and consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Our analytical framework extends across the whole of the Report. The Drivers Chapter is only intended to describe major scenarios of three important drivers that inform the subsequent treatment of Pressure-State-Impact-Response.</li> <li>• The details sought are beyond the scope of a national SOE Report. Exactly because this information is available and easily accessible elsewhere, it is only summarized here as logical input into the rest of the</li> </ul>

<p>patterns; technological and lifestyle changes; land use and urban development; economic demand, markets and trade; distribution patterns; institutional and social-political frameworks and value systems.</p> <ul style="list-style-type: none"><li>• The authors mix information on drivers and pressures and appear largely ignorant of the relationship between drivers and impacts and the resultant change in the state of the environment.</li><li>• The authors confuse predictions for climate change, population and economic development with well developed scenarios. The chapter does not prepare for, nor provide sufficiently for, an outlook for the future of Australia's environment based on current conditions and trajectories.</li><li>• The chapter is poorly referenced with regard to scholarly literature and international policy literature.</li></ul>	<p>Report.</p> <ul style="list-style-type: none"><li>• Not ignorant, but rather the report is structured that these connections are made in the subsequent Theme Chapters.</li><li>• If the Reviewer is looking for “predictions”, then s/he must look elsewhere. There is no scientifically-based framework to robustly predict a future based on climate and population models that are policy-dependent and embody their own inherent level of uncertainty. What we have done is to make it clear which of those scenarios we are tracking on to date.</li><li>• Sufficient literature is now cited to adequately support the inferences and implications and to give the reader access to the wider literature. This Chapter is not intended as a stand-alone, comprehensive literature review. It is a substantiated thought-piece on three major drivers of the environment, informing subsequent analyses in the Report.</li></ul>
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<b>Atmosphere</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• The Chapter is an extensive and, with few exceptions, well written factual account of the state of the atmosphere over Australia. There are several extra issues/areas that could be covered.</li>   <li>• Persistent Organic Pollutants are not discussed in the atmosphere chapter. Australia is a signatory to the Stockholm Convention on POPs and the atmosphere is a significant pathway for these POPs. POPs should be included.</li>   <li>• The section on pressures on Australian climate neglects mention of the short lived GHG tropospheric ozone, stated by IPCC 4AR to be the third most important greenhouse gas (causing greater radiative forcing than either nitrous oxide or any of the synthetic GHGs). The section makes only passing comment on aerosol which is acknowledged by IPCC 4AR to have a very uncertain radiative forcing that could be comparable with that from GHGs. The section [is substantially unbalanced and] needs rewriting addressing the full range of pressures on Australia’s climate. The importance of aerosol, for example is illustrated in the work of Rotstayn LD, Cai W, Dix MR, Farquhar GD, Feng Y, Ginoux P, Herzog M, Ito A, Penner JE, Roderick ML, Wang M. 2007. “Have Australian rainfall and cloudiness increased due to the remote effects of Asian anthropogenic aerosols? Journal of Geophysical Research 112: D09202, DOI:10.1029/2006JD007712.</li>   <li>• The section on “Stratospheric Ozone” covers ozone depleting substances, the Antarctic ozone hole and UV radiation and skin cancer. The section provides no information (apart from a cursory mention in the UV section), about the distribution, seasonal variation and long term trends of the total column amount of ozone over Australia. It is this column amount that regulates UV, is affected by the ODS etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Reviewer’s comments are appreciated.</li>   <li>• The focus of the sections of the chapter dealing with ambient air quality is on the criteria pollutants (in particular on ozone and particles) because these are the main pollutants impacting on human health. However, I have inserted material on POPs under the Air toxics sub-heading together with a reference to the relevant UNEP web site.</li>   <li>• I have inserted reference to short-lived tropospheric ozone ahead of nitrous oxide and noted the significant uncertainty in relation to the magnitude of radiative forcing associated with aerosols.</li>   <li>• The coverage of Stratospheric Ozone is far more extensive than in any previous Australian SoE Report. Figure 27 showing total column ozone for Melbourne and erythemal UV indices for Melbourne, Sydney and Adelaide have been redrawn and brought up to date with the assistance of BOM staff – an exercise that did in fact take some time to complete. If I were starting</li> </ul>

<p>and the preservation of the column amount of ozone is the primary societal concern. This data should be readily available from the Bureau of Meteorology monitoring network, and should be incorporated into the section.</p> <ul style="list-style-type: none"> <li>• The section on indoor air pollution does not fully explore the implications of indoor air pollution to pollution exposure. The common exposure expresses a person’s total exposure to a pollutant as the sum of the time in each environment times the concentration in that environment. Where indoor concentrations are comparable with or higher than those outdoors, the major exposure will be indoors. People on average spend 90% of their time indoors, line 1473. Thus there is mounting evidence in the light of recent studies that indoor air quality is an issue at least comparable with that outdoors, if not greater.</li> </ul>	<p>afresh, I would follow your advice, but there is now insufficient time before the chapter has to be finalized to do as you suggest.</p> <ul style="list-style-type: none"> <li>• The text has been expanded to make this point.</li> </ul>
Reviewer #2 - key points	Author response
<ul style="list-style-type: none"> <li>• The tabular method of displaying the report card on the state of the atmosphere is an original and welcome feature of the Chapter.</li> <li>• The chapter covers Climate, and “Other aspects of the Atmosphere”. Given the importance that climate, and especially Climate Change, now occupies in the public consciousness this way of dividing the material seems sensible.</li> <li>• My most serious criticism concerns the omission of pollen. We know that Australia has a high incidence of asthma and hay-fever. We know that some of these cases arise from seeds and pollen that are transported in the atmosphere. I think that totally excluding any mention of health effects arising from seeds and pollen is a mistake.</li> </ul>	<ul style="list-style-type: none"> <li>• Appreciate the positive feedback on this important new approach to the national SoE reporting.</li> <li>• Support noted with thanks.</li> <li>• Agreed – As noted above, I have now included reference to the significance of airborne seeds and pollen as contributors to Australia’s high incidence of asthma and hay fever.</li> </ul>
Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>• Section 2.1 “Current State and Trends of Australian Climate” was excellent, presenting the observed changes clearly and fairly.</li> <li>• Considerably more attention should have been paid to ozone-climate links, in particular recent</li> </ul>	<ul style="list-style-type: none"> <li>• Noted with thanks.</li> <li>• Discussion of these links has been expanded at a number of points and they are also</li> </ul>

<p>work identifying the impact of ozone depletion on southern hemisphere surface climate.</p> <ul style="list-style-type: none"><li>• The impact of the Montreal Protocol on climate forcing should also be more clearly brought out.</li><li>• Mid-latitude ozone depletion and UV changes need further explanation.</li></ul>	<p>considered in the chapter on the Antarctic environment.</p> <ul style="list-style-type: none"><li>• The examination of stratospheric ozone in this chapter is far more detailed than in any previous Australian SoE report. However, given the scope of the report and its broad target audience, it is neither possible nor appropriate to examine all aspects of the topic in the detail that some specialist readers might wish.</li></ul>
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<b>Inland water</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• This chapter contains a very useful synthesis of inland water from a national, regional and local perspective.</li> <li>• General conclusions are drawn from this synthesis which should be thought provoking as some are counter-intuitive – e.g. we are using less water, new water for cities is unlikely to come from the inland environment.</li> <li>• Climate change has, and will continue, to affect inland water and it is possible that our ability to manage its impacts is limited in many environments. The report puts a lot of trust in the widespread adoption of the National Water Initiative as a means of reducing extraction impacts on inland water environments. We all hope that this will prove the case but past water shortages have traditionally placed the environment towards the bottom of the priority list.</li> </ul>	<ul style="list-style-type: none"> <li>• Noted.</li> <li>• Have clarified the water use message as suggested.</li> <li>• Have underscored the need to adhere to NWI principles to mitigate further risks of overuse, as suggested.</li> </ul>
<b>Reviewer #2 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• The Chapter needs consistency about what to call the “drought” in SE Australia. Throughout the Chapter, this is termed the “Extended Drought”, the “Millennium Drought”, or the “25 year Drought”. In a similar context, the SW WA “drought” as it is termed in the Chapter should be called “climate change”. There is considerable evidence for this (see CSIRO) and water resource agencies are planning for a considerably drier future. Being termed a drought would suggest a return to wetter conditions.</li> <li>• The Chapter reports on the patchy nature of aquatic monitoring programs. The FARWH program has small mention in the Chapter. As a National Program (initially funded by DEWHA), FARWH is a good framework to incorporate much what has already been collected. The Chapter could suggest this and recommend FARWH for future SoE reporting.</li> <li>• In some Sections (e.g. 1.2.2), including</li> </ul>	<ul style="list-style-type: none"> <li>• This advice has been heeded and changes made throughout text to acknowledge the climate change component of recent droughts.</li> <li>• The FARWH synthesis report is anticipated and noted in the special text box, along with the hope that future SOEs will be able to base river and wetland condition on this national approach.</li> <li>• The north-south contrast in water use rates</li> </ul>

<p>northern and southern indices of water use is misleading. With about half the continental flows in tropical Australia and almost zero regulation, aggregating the statistics does not adequately describe the situation in southern Australia.</p> <ul style="list-style-type: none"> <li>• In Sections where much information on different regions/ divisions is presented (e.g. 2.1, 2.2, 2.3 etc), this should be displayed under sub-headings (either region or drainage division) to help the reader through the extent of information.</li> </ul>	<p>is now explicitly mentioned.</p> <ul style="list-style-type: none"> <li>• We have added additional formatting to sections with dense information to improve readability.</li> </ul>
<b>Reviewer #3 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• The chapter is extremely well written and an accessible plain English narrative on Australia's inland water resources.</li> <li>• The approach taken to reporting, viz, state, pressures, effectiveness of management, resilience, risks and outlooks is commended.</li> <li>• Further treatments of salinity, water intercepting activities and connectedness of surface water and groundwater systems. would improve the report.</li> <li>• Managing for extremes is the new water resource management paradigm.</li> </ul>	<ul style="list-style-type: none"> <li>• All noted.</li> </ul>

<b>Land</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• The key findings as currently expressed do not reflect the detailed tabular assessments where most grades are poor and most trends downward</li>   <li>• Good use of the very patchy and limited data available but all sections are diminished by the lack of data that would be generated by a comprehensive national monitoring system Broad brush national overviews are necessary but some case studies of selected regions which exemplify key processes ,pressures and problems and where the necessary data do exist could be very instructive.</li> </ul>	<ul style="list-style-type: none"> <li>• The reviewer is correct in terms of the trend of many individual indicators. The key findings attempt to present this information dispassionately. The conclusion that the outlook is ‘mixed’ reflects our assessments that some aspects of land management have improved, and that this should be acknowledged as well as the larger context of adverse trends.</li>   <li>• Fair point, but we elected not to take this form of approach.</li> </ul>
<b>Reviewer #2 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• Tightening up on referencing is essential from an academic viewpoint. I see that the comment bar on the right has some referencing, but there are a lot of general statements that are unsubstantiated—probably because they are general. This may have been the suggested style of the SoE template—less academic and more general statements but there is a risk in that I would not cite an SoE unless I could follow up on the references. I note on technical issues the author does attribute, so there is a mixed approach here that needs tidying.</li>   <li>• Overall, there is a sentiment that the production and conservation ‘future’ is still siloed because that is how we continue to report it—and this may be because traditional reporting goes from section to section as isolates—land, water, compaction, cultivation, etc. I recognize that this may be required from previous SoE practices, and suggest that to show the author understands these isolates are all in the same system(s) or are sub-systems of the same continent, that there are integrating</li> </ul>	<ul style="list-style-type: none"> <li>• Addressed in revisions.</li>   <li>• As the reviewer notes, some of this may be an artifact of the SoE reporting structure. We hope it is addressed by the cross-cutting chapters, and need to ensure that is the case.</li> </ul>

<p>paragraphs (just a few lines) at the end of the sub-sections. I provided an example earlier. Philosophically this seems critical in the SoE setting the expectations of an integrated approach to achieving optimum outcomes (surely the purpose of the report)—setting the ‘bar’.</p>	
Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>• The Land chapter provides a comprehensive overview of current pressures on Australia’s land resources and likely future trends.</li> <li>• An important conclusion for policy makers to consider is the lack of resources and capacity to manage some landscape-scale pressures and the predicted impacts of climate change.</li> </ul>	<ul style="list-style-type: none"> <li>• Noted, with thanks.</li> <li>• This point might best be addressed in the overview section of the report; we have highlighted it in this chapter.</li> </ul>
Reviewer #4 - key points	Author response
<ul style="list-style-type: none"> <li>• Some of the wording used in particular sections such as the one on production forestry, needs to be reworded to avoid wrong interpretation.</li> <li>• Some of the diagrams are not particularly well designed to convey the intended information and in certain cases might be better designed as different types of diagrams. Some diagrams could be augmented with more information.</li> <li>• While the chapter is generally well written for a general audience, there is some tightening that could be done particularly in section 4 where there is presently a hint of repetition.</li> <li>• Some extra detail could be added in particular areas. For example, describing the changes in expenditure on native forest research resulting from shifts in commercial forestry, Australia’s quarantine barrier and its effectiveness, and biocontrol of weeds.</li> </ul>	<ul style="list-style-type: none"> <li>• These points have been addressed to the extent possible with available data, and consistent with the overall purpose and style of the chapter. All specific points of correction/ clarification have been addressed; not all amplifications suggested have been possible. However, we believe the chapter is much improved as a result of us attending to the points the reviewer raised.</li> </ul>
Reviewer #5 - key points	Author response
<ul style="list-style-type: none"> <li>• The Land chapter provides a well researched, comprehensive and current coverage of relevant issues.</li> <li>• Soil salinity is a major omission from the Land</li> </ul>	<ul style="list-style-type: none"> <li>• Noted, with thanks.</li> <li>• Salinity now included in chapter.</li> </ul>

<p>chapter because it is a current threat with measurable impacts on land productivity, offsite water quality and aquatic habitats, and on infrastructure. These impacts are important for groups as diverse as landholders and all levels of government. It warrants inclusion as a fourth key indicator of soil condition, particularly as it has been covered in previous SoE reports.</p>	
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<b>Marine environment</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• Australia has management of and responsibility for an extremely diverse maritime jurisdiction from the tropics to the sub-Antarctic.</li> <li>• Australia's marine environment has major roles in what are termed ecosystem services. Maintaining ecosystem resilience is important.</li> <li>• Management of Australia's marine environment reflects a sectoral focus and an incremental reactive approach.</li> <li>• It is timely to revitalise mechanisms to ensure greater integration between and within jurisdictions and sectors.</li> <li>• A key factor is to address the challenges of ongoing risks to ecosystem, economic and social service provided by Australia's marine environment.</li> </ul>	<ul style="list-style-type: none"> <li>• I thank the reviewer for the comments here; each one of these matters is, I believe, well represented in the report. There are many limitations, not least of which is the lack of appropriate information base from which the SOE report could be prepared. Nonetheless, the chapter draws on the contemporary evidence and information that is available, and highlights a tractable set of issues that can be addressed in the future.</li> </ul>
<b>Reviewer #2 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• Good coverage of a huge issue with limited data for an area 3.5 times Australia's land mass.</li> <li>• Surrogacy based on geology, water masses and fish has provided an important initial understanding at the necessary scales.</li> <li>• The absence of information on seabed and water column invertebrate communities is a matter of major concern for understanding marine ecosystem resilience in the face of the expected effects of climate change.</li> </ul>	<ul style="list-style-type: none"> <li>• Noted, with thanks.</li> <li>• I agree with both these major points. Eventually SOE reporting will have to move beyond use of some available surrogates and crudely measured indicators developed for other purposes, and a few selected examples to provide a more informed and specific set of assessments on the state of the marine environment. It would probably be best to start with a small set of measurable national key marine indicators, for which agreement and resources can be secured. This minimum set could then be expanded as needs and resources permit. Undoubtedly one set of such information would relate to the 'unseen' elements of the biodiversity, such as the primary production base and the invertebrates, both of which have such critical roles in underpinning many of the more visible ecological values.</li> </ul>

<ul style="list-style-type: none"> <li>• The critical need for a nationally integrated approach to marine management has been identified many times over several decades. Difficult though the issues are it is important for governments of all levels and persuasions to establish and implement a robust strategic framework to maintain the values of our marine ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>• I wholly agree on the need for a uniform national system of multi-level governance established to implement an integrated approach for managing the marine environment of Australia’s jurisdiction. The challenge is evident and proximal, and delay will enhance the difficulty of maintaining, or as necessary, rebuilding the ecological values. I argue in the report for the first step in an integrated system to be the development of a compliance system (and indeed also argued for the global oceans by others) that includes monitoring, assessment and reporting as a core function. The setting of universal standards (against which compliance would be reported) is an inherent requirement, but may require some considerable further resources and development to secure agreements on what constitutes the values and at what level should they be maintained. Together, if these matters propagate across all levels of government, they would form the central pillar of an integrated governance system for the oceans that could be focused on maintaining the values.</li> </ul>
<p><b>Reviewer #3 - key points</b></p>	<p><b>Author response</b></p>
<ul style="list-style-type: none"> <li>• The separation of coasts and oceans into separate themes is illogical given the multiple links between these two environments. Inevitably, coastal issues are discussed in the marine chapter and there is potential for duplication in the SOE report i.e. the same issues are discussed under both themes; or omission, where an issue may be missed entirely through lack of coordination of the authorship or review of the two separate chapters.</li> <li>• The marine chapter is distinctly biased to southern Australia and demonstrates a lack of understanding of north Australian issues. The use of multiple authors may assist in remedying this.</li> </ul>	<ul style="list-style-type: none"> <li>• All chapters of the SOE report have overlaps. Coasts was established as a separate theme in this report in recognition of the unique sets of issues and the need for coast-specific reporting.</li> <li>• The reviewer asserts that there is a bias towards southern Australian issues, but appears to have come to this conclusion mainly on the grounds of the extent of treatment of temperate issues. The same effort was expended by the collective expert workshops in addressing both tropical and temperate issues, and it therefore seems unlikely that this is the basis for a southern bias. The treatment of temperate Australia</li> </ul>

<ul style="list-style-type: none"><li>• The absence of “Indicators” as used so effectively in the 2006 SOE reduces the credibility and comprehensiveness of the 2011 SOE; and limits its ability to support analysis of long term changes.</li><li>• The chapter provides only a cursory representation of Indigenous issues and does that with limited effectiveness. A case study on the growing capacity and contemporary engagement of Indigenous people in land and sea management across north Australia, written from an Indigenous perspective, is badly needed.</li><li>• The discussion of the Australian Government’s Marine Bioregional Planning process needs to be corrected and updated, not least because the MBP regions form the basis of regionalization that guided the expert assessments that informed the SOE and the structure of the SOE chapter.</li></ul>	<p>issues may seem more expansive in the report because there are more serious issues in temperate Australia. However, the importance of the tropical issues is recognised in the individual treatments of North West, North and East regions. These were the findings of the national expert condition assessment workshops, and I have sought to maintain that balance in the chapter.</p> <ul style="list-style-type: none"><li>• The chapter is wholly based on indicators, to the extent that there were available data. The ‘indicators’ preferred by the reviewer were either not available for use in the 2011 assessments, or were poorly focused and addressed marginally relevant aspects of the DPSIR approach adopted for this SOE report.</li><li>• Case studies on Indigenous seacountry were repeatedly sought from a number of sources for inclusion in this chapter. The draft case study material that could be assembled for inclusion has been rejected by the reviewer as inappropriate and offensive to Indigenous people, and so has been removed. It is indeed unfortunate that no acceptable material was available. Acceptable coverage of this area would most likely have made an important contribution, but has not been able to be secured in time for inclusion in the report.</li><li>• The treatment of the Marine Bioregional Planning system is taken from authoritative and independent experts, and cited documents. The regionalisations referred to by the reviewer preceded the bioregional planning system by many years, and is an acknowledged achievement. The current process of bioregional planning is not comprehensive and has a number of significant weaknesses - principally, it is not a national system, it is a Commonwealth system, and largely ignores the environments of the inshore waters controlled by the states and territories. The expert assessments were conducted across all parts of the marine environment, not constrained by the jurisdictional divides.</li></ul>
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Reviewer #4 - key points	Author response
<ul style="list-style-type: none"> <li>• Marine Planning Bioregions as the unit of assessment is too coarse (only five Marine Planning Bioregions). It makes aspects of the report questionable as it is very difficult to make comment on such large areas. For example, the East spans from the tip of Cape York to the NSW/Victorian border. The report could consider finer scale reporting using Provincial Bioregions and Coastal Regionalisation. Another way to improve the clarity of the chapter would be to include more examples in the assessments (habitats, populations, ecological processes, ecosystem health).</li> <li>• The lack of good baseline data on the distribution, abundance, natural variability and vulnerability of key species and ecosystems (including processes) is a major issue and key priority if we are to achieve the improvements flagged in the report. This should be given more prominence in the report.</li> <li>• Overall the report was very good but its treatment of emerging/rapidly increasing uses was a bit “light on”. For example shipping - it is forecast that the demand for port capacity will double in size every decade in response to increased economic growth in the cities and in response to demand for Australia’s exports. For instance, ABARE has forecast that iron ore export will grow by 68% to 640 Mtpa from 2010 to 2015 due to strong demand from overseas. In 2009-10 Australia’s LNG exports reached 17.9M tonnes – an increase of 16% on</li> </ul>	<ul style="list-style-type: none"> <li>• Agreed; but the data and information are equally missing for many of the subset spatial units, and in many ways it wouldn’t solve the overall problem; a report on selected examples would always suffer from sampling bias, and at least this way, it can explicitly identify the error bounds of the error and is somewhat more quantitative. Including specific examples is fraught, again exposing the selective sampling problem. So I agree, but it’s hard to deliver on finer spatial scales in an equitable manner with so little data, and on balance I consider the present 5 regions to be a reasonable compromise. This is not to argue for this to be done again at this level; it would be better to develop region reports by aggregation from sub-region data, but that is a big resource commitment that I hope will be the future for SOE national. The ideal solution would be to simply roll up state reports and add the federal jurisdiction, but that’s even further away from where we are.</li> <li>• Baseline data: agreed. A good system of governance would be based on such data and information, and it’s hard to see how such knowledge would not be part of a strong set of integration arrangements. For example, it’s difficult to see how outcome-oriented management objectives could be constructed for any region/ subregion, in the absence of good baseline knowledge the distribution, structure and function of ecosystems and processes.</li> <li>• Aquaculture is an emerging industry, and given more detailed space. Agree on the issues with ports, and thanks for the pointer to the updated information. This has now been included in the outlook.</li> </ul>

<p>previous year and the 2010-11 forecasts an additional 5% to 18.8M tonnes<sup>1</sup>. The key environmental challenges facing ports include: the increasing pressure from the growing port freight traffic on communities and the environment which are located along the port supply chain, including sea channels, ports and landside transportation corridors; and. adaptation to future changes in the natural environment where ports operate. Port infrastructure normally has a life time longer than 50 years and even up to several centuries. It is forecast that over such a long time the changes in the natural environment, such as the frequency and the intensity of extreme weather events and sea current / wind / sediment pattern, will become significant.</p>	
Reviewer #5 - key points	Author response
<ul style="list-style-type: none"> <li>• Overall, I strongly support the primary assertion of the document that marine management in Australia needs integration across regions as well as between Commonwealth, State and Local levels of government. This aim will require greater National co-ordination, including a possible integrated national marine condition assessment and reporting system. Management needs to become ecosystem based (this has already begun in some areas, a fact not necessarily recognized in this document) and account for the cumulative impacts of the many activities impinging on the marine environment.</li> <li>• In terms of threats and risks to the marine environment, I found the authors to be overly pessimistic about the effects of fishing, with a need to recognize that not all fisheries in Australia are in the process of being fished down to extinction. There are a number of examples of well-managed, sustainable fisheries such as the Commonwealth Northern Prawn fishery. Conversely, I found that the risks posed by the oil and gas industry and catchment inputs to the marine environment are sometimes underemphasized in this document.</li> </ul>	<ul style="list-style-type: none"> <li>• The review appears to consider that ecosystem-based management in fisheries is an example of integrated management. Fisheries EBM is based heavily on risk assessment procedures that are controlled by the fishing sector, and there have been some good achievements in relation to threatened species. However, this is not integration, and much more resembles good business practice (dealing with specific risks to an ongoing economic base for fishing).</li> <li>• The report identifies specific issues with fishing and fisheries; nowhere does it argue that fisheries will drive species to extinction, and indeed the report presents examples to the contrary, where targeted species are in the process of recovery using good management practices. Fishdown has occurred in almost all fisheries for which there are data, irrespective of how well a stock is currently being managed. The principal point being made about this is that there is a long history, and present day perspectives can conveniently ignore the</li> </ul>

<sup>1</sup> Source: Australian Commodities Vol 17 no.4(2010), p725. ABARES

history, when it seems uncomfortable. In this case, fishing down populations to levels of less than 25% of virgin biomass is mainly historic, but has had, and continues to have major ecological effects, given that this applies to many of the large species in the ocean. The cumulative impacts of this legacy have been studiously ignored in setting of present day targets for fished populations. The report does point to the very limited acceptance in Australian fisheries management systems of the need for high levels of biomass of target species to be retained to provide for high levels of resilience and for normal ecological interactions and functions to be maintained in ecosystems. The best fisheries management practices (such as those managed under the CCALMR system) aim to retain biomass levels of at least 75%, levels that virtually no Australian fish stocks have seen since the commencement of fishing. In the highly dynamic ocean systems we presently face, the maintenance of stocks in 'sustainable' fisheries at levels typically below 25% of their unfished biomass therefore represents a serious threat to their resilience and to the resilience of the associated ecosystems. The interaction between fishing and climate change impacts for example is now becoming evident as a substantive issue. The key point here is that this is a report about the state of the environment; it is not an analysis of industry sustainability. The mandate of this report is to consider any threats or risks to the condition or the inherent resilience of Australia marine environment, and assess and report such matters in a balanced way. While there is considerable discussion about ecosystem based management in Australian fisheries, there is little evidence that there has been any significant change in management systems or their outcomes based on the implementation of this concept. Many improvements have been made, based on such approaches as risk assessment, but these in themselves are not a form of integrated management. Key tests of the impact of EBM cannot be satisfied in most Australian fisheries, and this is well

<ul style="list-style-type: none"><li>• In the assessment tables provided throughout the document there are consistent contradictions between the classifications (condition, impact etc) and the associated written summaries</li><li>• The chapter does provide a comprehensive coverage of the issues, the only problem is that sometimes the examples used have limited context and may be misleading if interpreted from a national viewpoint. For example, the status of recreational fishing information only comes from South Australia, and therefore may be misleading if trends are not similar in other States.</li><li>• In some parts of the document there is a tendency to for the language to become emotive, which may disenfranchise some readers, so that they will be less likely to be convinced by the inherent argument.</li></ul>	<p>documented in a number of recent analyses and journal articles related to fisheries worldwide.</p> <ul style="list-style-type: none"><li>• The risk assessment conducted for this report is inherently subjective (as are all such assessments), and has been drawn from the inferences made in a series of expert workshops. The reviewer's comments no doubt reflect some of the range of views on risks. In the absence of evidence and data, the basic risk assignments remain as in the draft. Some fine-scale improvements have been made to the original draft as a result of this and other reviewer's comments and inputs. The apparent contradictions represent a misinterpretation by the reviewer of what the tables contain; they are intended to provide a summary of the range of conditions, with the actual score-based assessments taken from the workshops providing the overall central judgment.</li><li>• The limited examples available for use in this report demonstrate the lack of any form of integrated approach to environment management and reporting of marine systems. While there is always a risk that selected examples may pose a bias, this has been benchmarked by securing input from experts at the series of national workshops to try to minimize any such bias. The reviewer raises this as a potential issue, and this is acknowledged. However, there have no instances where this is thought to have represented an actual bias, and no competing interpretations have been presented by the reviewer.</li><li>• The report is intended to be engaging and accessible; language style is a matter for editorial policy and is obviously a compromise between presenting the technical case and an accessible document with broad reader appeal. Chapter authors have little control over the editorial style imposed on the text, graphics and layout. Convincing the readers is a balance between technical clarity and accessibility.</li></ul>
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<b>Antarctic environment</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• Focus of the Chapter                             <ul style="list-style-type: none"> <li>○ Lines 210-214 admirably set out a rationale for what is to be included in the Chapter. The Chapter’s objective is to ‘set a benchmark for future monitoring of environmental change and the outcomes of management actions...’ by examining a series of selected indicators. Several of the physical factors selected are subject to management actions, such as the repairing ozone ‘hole’, but many are not. Nevertheless, trends in Antarctic climate are important and generally adequately covered.</li> <li>○ The section (2.2) on the Southern Ocean focuses heavily on CO2 uptake and decreasing alkalinity, over which Australia (nor any other nation) has any control. The living environment concentrates on introduced crabs in W Antarctica – something for which there is no evidence for in East Antarctica/AAT (unless I am wrong).</li> <li>○ The pelagic environment takes us back to CO2 uptake, and doesn’t talk about possible paradigm shifts in plankton distribution – a topic researched by Australia for 20+ years. The short section on benthos (line 516) concentrates largely on iceberg scour – hardly a significant issue in East Antarctica. Two or three years ago Australia undertook a significant amount of marine benthic research, both from a biological and bottom-habitat perspective but this is not mentioned.</li> <li>○ The part on Terrestrial environment concentrates on bryophytes, which is fair enough, but why is there no mention of microbial ecology? Work at Casey has been looking at microbial ecology with respect to environmental rehabilitation for many years. And why is the Assessment summary (Table 2.5) restricted only to vertebrates?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The draft provided to the referees was still an early version. The chapter has been thoroughly reviewed and many alterations were made to incorporate the referees’ suggestions.</li> </ul>

- Below (under Balance) I have drawn attention to the way in which station usage data have been used, or not been used! In this context I assume the Assessment summary (Table 2.6) is based on data from all our stations, and not only the data presented in the Chapter?

- Balance

- My understanding of the objective of the periodic “State of Environment” reports is that it should enable the reader to form an opinion about whether a part of Australia’s environment is improving or deteriorating, and whether conservation and other measures are effective, when the last 5 years is compared with the five preceding it. In this Chapter on Antarctica I would thus have expected to find a focus on Australia’s footprint at our three main continental stations and on Macquarie Island. Some few data are presented in Section 2.4.1 (Operational Indicators) showing number of person days by month for all stations and all ships (Fig 2.5) and electricity usage at Mawson station. (Fig 2.6). Why are there no figures for electricity usage, and generator and fuel usage, at Casey and Davis? The computerized building control management system introduced over the last decade provided clear evidence of energy saving in its early days; I found no mention of it in the 2011 report. And why is there no mention of the air transport system, introduced since the last SoE Report was published? There is now a mini-station at Wilkins runway operating during the summer. How much is it adding to Australia’s use of fuel in Antarctica, and generally increasing our footprint? Are there new pressures resulting from this activity?

<ul style="list-style-type: none"><li>○ The chapter should be a comprehensive overview of the state of the Antarctic environment. A greater balance is needed in many sections, for example in sections dealing with ecosystems there overly much focus on vertebrate animals and insufficient focus on the terrestrial and marine environment. A clear example is at line 993 <i>et seq.</i> The section on Marine Species deals only with marine mammals. A good thing that could have been said here is that the IMO has recently introduced a ban on heavy fuel oils for shipping in Antarctic waters, so lessening one pressure of the marine environment that has been with us for decades.</li><li>○ In dealing with governance the role of IMO, IWC and CCAS needs to be acknowledged – CCAMLR is only one (albeit a big and important one) instrument of governance. Sources quoted need to be chosen from a widely balanced perspective.</li><li>● Detail/accuracy/precision of writing/inconsistency/over-generalisations<ul style="list-style-type: none"><li>○ The Chapter contains inconsistencies of fact, nomenclature, a lack of precision writing in places, lack of attention to some detail, and some over-generalisations. Its credibility will be compromised by inconsistencies and lack of attention to fine detail. Not all this can be fixed by Departmental editing – the author must ensure absolute accuracy in all details, including references. The language used is, in places, too assertive; the use of more conditional phrases (such as ‘appears to be’, ‘should’, ‘may be’, ‘is anticipated to’ etc) helps to build the reader’s confidence. (see SCAR’s assessment of Antarctic climate 2009 – to me this uses conditional language very well.)</li></ul></li><li>● Area of coverage</li></ul>	
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<ul style="list-style-type: none"> <li>○ A decision needs to be taken about whether the chapter is about East Antarctica/AAT and Australia’s sub-Antarctic Islands, or the whole of Antarctica, or a combination of both. Much of the published literature on future climate of Antarctica builds on whole-of-continent data so it is almost impossible for this Chapter to not incorporate continent-wide trends (and neither it should). If the Chapter deals with a combination of AAT and whole-of-continent, conclusions drawn need to be clearly identified as applying to the AAT or more widely. This is highlighted in discussions about warming trends that are very pronounced on sea ice, shelf ice and the ice cap in West Antarctica, but very much less so in East Antarctica/AAT at present. The consequences to biota are also very different making it imperative that a balanced interpretation is given with respect to the geographical area of Australia’s responsibility.</li> </ul>	
Reviewer #2 - key points	Author response
<ul style="list-style-type: none"> <li>● Well written and comprehensive scientific overviews of the key Antarctic and Southern Ocean processes.</li> <li>● Assessment Tables provide summaries of impact and trends, and these are qualified by confidence ratings for both knowledge of the topic and agreement about the evidence.</li> <li>● Good use of case studies, figures and charts, to support quite complex scientific narrative.</li> </ul>	<ul style="list-style-type: none"> <li>● The review efforts are highly appreciated.</li> </ul>
Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>● The report should separate the consideration of the drivers of change at Macquarie Island from those and HIMI and the AAT. It may be politically expedient to group them together but the drivers of change are so different that it is not really possible/sensible to generalize across all sites.</li> <li>● Details of the physical process involving the</li> </ul>	<ul style="list-style-type: none"> <li>● If this were a report in its own right, much more detail could be provided. Some background information will be available in other chapters of this report.</li> <li>● This section was rewritten.</li> </ul>

<p>interaction of the ozone hole and climate warming need to be clarified.</p> <ul style="list-style-type: none"><li>• The tables of indicators require some explanation - these are particularly difficult to interpret as they appear to be highly subjective with regard to what is 'good' or 'bad'.</li><li>• The report does not give any indication of the potential benefit of changing climate for Australia in this region. The premise that all change is bad is a somewhat blinkered (although frequent) response and given the role of Australia in Antarctic affairs (and the size of the AAT claim) such a forward looking section might be useful.</li><li>• The big risk (at least in my opinion) is that everyone continues to say we don't have enough data to understand what is happening - does chapter 7 of this report offer an opportunity to highlight some of the areas where a positive contribution can be made – either in research or in governance mechanisms.</li></ul>	<ul style="list-style-type: none"><li>• The tables and the approach to this report are explained in a separate chapter.</li><li>• I cannot see a potential benefit that will make Antarctica a better place in the long-term. SCAR's report from 2009 provided a 100 year outlook which did not highlight any positive outcomes of the changes expected to occur.</li><li>• We also cannot afford to pretend that we know enough to be certain about the future. Throughout the chapter there are examples of how Australia has made positive contributions.</li></ul>
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<b>Biodiversity</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• Table 4 is central to the report but the information it provides is incomplete, inconsistent and fragmented. The Table requires serious attention before it is ready for wider dissemination.</li> <li>• A figure that summarises changes in the extent of native vegetation over time is a significant omission, to support the claim that rates of clearance have declined. Maps of land clearance over the last 5 and last 20 years would make very useful contributions. The report also requires some estimate the overall current rate.</li> <li>• The report should use colour schemes that reproduce unambiguously in grey scale, and that can be interpreted by colour-blind people.</li> <li>• The report uses passive voice in a number of places that makes it difficult for the reader to assess whether it is the opinion of the author or a report of an opinion by another person. Active voice would remediate most of these issues.</li> <li>• In Section 2, some interpretations of data and use of broad generalisations seem a little careless, and treatments are uneven. The chapter should be reviewed, but the specific points above and those documented on the hard copy indicate many instances. I suggest beginning each subsection with a sentence that summarises the state of the element, followed by another sentence that summarises future expected conditions or trends.</li> <li>• Some parts of Section 4 lacked information; material on invasive species and pathogens seems very incomplete. Table 18 is an important element and the information it contains is very uneven, ranging from broad policy statements to detail on biological outcomes.</li> <li>• Several parts of the document are incomplete, noting 'references needed', and with blank Table cells.</li> </ul>	<ul style="list-style-type: none"> <li>• The reviewer's specific comments on this table have been addressed.</li> <li>• This is done in the Land chapter</li> <li>• Noted and is being addressed</li> <li>• This is a style issue to be addressed by the editors</li> <li>• Good suggestions. This is the purpose of the summary tables at the end of each section.</li> <li>• These issues have been addressed above. The uneven reporting about invasive species reflects their uneven treatment in jurisdictional reports.</li> <li>• Fixed</li> </ul>

<ul style="list-style-type: none"> <li>Some parts of the chapters are marred by unsubstantiated claims that seem, superficially at least, to reflect the personal values and fears of the authors. These should be carefully worded and supported, or omitted.</li> </ul>	<ul style="list-style-type: none"> <li>Addressed, noting that in several cases where the reviewers considered claims to be personal or unsubstantiated the views reported were drawn from published literature, usually peer-reviewed, and the citations were given. We have tried to make this clearer.</li> </ul>
Reviewer #2 - key points	Author response
<ul style="list-style-type: none"> <li>The chapter is surprisingly direct about the repeated failures of governments and land management agencies to halt or even slow the decline of Australian biodiversity and environments. This candor is commendable. The key measure of the success of the report, however, will be whether any recommendations made for new directions or strategies are carried through such that the next SoE doesn't once again report on failure.</li> <li>Overall, the report paints a fairly bleak picture, both of the current state of the Australian environment, and its future prospects. While a valiant attempt is made in the last section to paint a more optimistic scenario, it is regrettably not as convincing as the pessimistic one.</li> <li>The interactions of the relatively new stress of climate change with existing stresses could have received more attention, indeed synergies between stresses in general could have had a greater focus. It is likely that the indirect impacts of climate change, via fire and invasive species will be as, or more important, than gradually increasing temperatures. As for the "Drivers" chapter, the key thing to stress is that climate change will be an <i>additional</i> stress onto a system already suffering, and our response to climate change should be largely focused on increasing the resilience of our ecosystems via reversal of existing stresses such as habitat loss.</li> </ul>	<ul style="list-style-type: none"> <li>We have avoided recommendations but tried to make honest and objective assessments.</li> <li>Noted.</li> <li>These points have been included in revised text.</li> </ul>

Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>• The SoE report should be definitive, evidence-based, objective, and data-rich. This draft is none of those. Rather, this is a largely undistilled and uncritical cut and paste from state SoE reports, the recent <i>Assessment of Australia's Terrestrial Biodiversity</i>, and a few other key reports. There is little quantification, much subjective generalisation, and no original analysis.</li> <li>• There is a clear lack of continuity from, and reference to, previous SoE reports, and this severely hampers the ongoing assessment of trends in biodiversity and the effectiveness of management responses. It is time that SoE reporting settled to an agreed set of indicators rather than re-designing anew at every cycle.</li> <li>• There is a lack of clarity about the period over which trends are reported here. In some cases it appears to be relating to the period since European settlement; in other cases it appears to be a much more current reporting period. There is a case to do both, but the focus should be on the period since the last SoE report, and there needs to be far more explicitness about the periods for which trends are reported.</li> <li>• There appears to be no consideration of the recent Australian biodiversity conservation strategy. There is reasonable argument that this should set the targets and goals against which SoE can measure progress. As it stands this draft suffers from a lack of high level recognition that trend reporting should be based on some target, rather than simply a non-directional measure of change.</li> <li>• The introductory section should be far more explicit about how this chapter fits with other chapters in the overall SoE report, and where the detail is reported. This is particularly the case for marine species, but also for aquatic species, vegetation clearance, and climate change.</li> <li>• Some important sources are overlooked.</li> </ul>	<ul style="list-style-type: none"> <li>• We have reported broad conclusions. This chapter is a synthesis one.</li> <li>• A modern trend among many disciplines is to move away from strict reliance on indicators and towards a more synthetic narrative. We made the judgment that there is simply not enough information on most of the indicators used previously to justify a regimented indicator-based approach. We have chosen to draw on relevant information and discussion to address the key issues.</li> <li>• We have assessed change over the period of the past three national SoE reports (15 years) where possible but have also referenced current conditions to 1750.</li> <li>• Reference to the recent Biodiversity Conservation Strategy is made at several points in the chapter. Explicit targets are not necessarily what state of the environment reports report against and it is not for SoE 2011 to make such recommendations to the Australian Government. The benchmarks that we have adopted are discussed further in the introduction.</li> <li>• There is an introductory chapter at the front of the report, and this outlines the context for each of the chapters. There is more clarity on these and other subjects with access to the complete report.</li> <li>• This chapter goes to a great deal of effort to</li> </ul>

<p>These include: the Natural Resource Policies and Programs Committee. Biodiversity Decline Working Group (2005). <i>A national approach to biodiversity decline</i>. Report to the Natural Resource Management Ministerial Council (and the equivalent document for marine biodiversity), UNEP’s global environmental outlook (because the SoE should be somewhat more contextualised with the state and trends for biodiversity at a global scale), the <i>Living Planet Index</i>, and the recent definitive assessment of conservation status and trends for Australian bird species (coordinated by Professor Stephen Garnett). The latter provides a robust assessment of recent trends for all Australian bird species (and subspecies).</p> <ul style="list-style-type: none"> <li>○ The <i>Living Planet Index</i> (<a href="http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/">http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/</a>) provides a good template for charting trends in Australian biodiversity. It is salutary that such robust quantitative coordination of trend data for many species can be collated across all countries by an NGO, but is apparently not possible across all Australian jurisdictions. This SoE draft overlooks (again) the very large amount of biodiversity monitoring data that are collected in Australia (I’d estimate that there are monitoring programs for at least 100 threatened species, as well as many to most exploited species), and the collation of these should be a foundation source for SoE reporting.</li> </ul> <ul style="list-style-type: none"> <li>● At the least there should be some recognition of the biodiversity extinctions over the period since the last SoE report.</li> <li>● There should also be some recognition that (much of) Australia’s biodiversity is influenced by factors operating outside Australia. This obviously includes climate change, but also should include take outside Australian waters of whales, tuna, and other exploited marine species. Notably, at least 10 Australian migratory shorebirds will now be recognised as threatened because of losses of critical habitat in China and Korea (greatly</li> </ul>	<p>synthesise information from across a great number of reports and other literature. Several of these sources of information are now used in the chapter.</p> <ul style="list-style-type: none"> <li>● We agree that access to primary monitoring data would have been important if it was available for the whole nation and if analysing it would have led to any conclusions other than those already contained in the latest state and territory reports. For better or worse, the intention of this chapter was to give a national overview of biodiversity issues.</li> <li>● Noted</li> <li>● Noted</li> </ul>
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<p>reducing the population of those birds using Australia in the non-breeding season).</p>	
Reviewer #4 - key points	Author response
<ul style="list-style-type: none"> <li>• The draft report fails to recognise limitations and risks of an ecosystem approach to conservation. Much biodiversity can be lost despite the ecosystem more or less remaining in place.</li> <li>• The draft report gives the impression that the land-clearing problem is now over with the exception of ongoing legacy effects. However, this downplays the significance of the accumulating impacts of stable levels of land clearing, extremely high levels of land clearing in some parts of Queensland, and accelerating land clearing in the Northern Territory.</li> <li>• The draft report fails to consistently acknowledge that climate change is an intermediate driver of biodiversity decline, produced by the main drivers of population and economic growth in carbon-intensive economies.</li> <li>• The draft report generally inadequately describes the drivers behind the expanding list of invasive species (such as world-trade agreements and inadequate quarantine measures), and fails to acknowledge the catastrophic magnitude of the potential impacts of new and emerging invasive species.</li> <li>• The draft report shows major inconsistencies in use of publications. Some of the report makes use of the peer-reviewed scientific literature, while other sections rely entirely on past SoE reports (which are grossly inadequate) and The Assessment of Australia's Terrestrial Biodiversity 2008. This gives a misleading idea of the state of knowledge where recent scientific literature has not been reviewed.</li> </ul>	<ul style="list-style-type: none"> <li>• We think this is a misunderstanding of the application of an ecosystem approach as outlined in some detail in the revision to the <i>Environment Protection and Biodiversity Conservation Act 1999</i> Act. There is no intention of forgetting about species.</li> <li>• This has now been addressed.</li> <li>• We did not intend to give this impression. We have tried to be clearer about direct and indirect drivers (in fact we already had two figures making this point in the text). Nevertheless, climate change is a driver in the sense that it creates pressures that have to be addressed.</li> <li>• We have made these very points but we have now strengthened them.</li> <li>• Balance addressed.</li> </ul>

Reviewer #5 - key points	Author response
<ul style="list-style-type: none"> <li>• The SoE attempts to present information in new formats and with a stronger conceptual/science content that in previous SoE reports.</li> <li>• The quality of the SoE remains constrained by the quality of the primary source data which can be inconsistent, lack detail and limited to snapshots rather than time series adequate for detecting real trends.</li> <li>• It remains difficult to make clear links between drivers and pressures associated with human land uses and the impacts they have on biodiversity. This in turn constrains analysis of options for responding to current conditions and future changes.</li> <li>• The SoE presents a number of interesting ideas, such as from the ecological resilience literature, that have the potential to inform research, management and reporting on biodiversity in the future.</li> </ul>	<ul style="list-style-type: none"> <li>• Noted.</li> <li>• Many corrections have been made regarding the primary sources of data.</li> <li>• Noted.</li> <li>• Noted, with thanks.</li> </ul>

<b>Heritage</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• Natural heritage and the National Reserve System (NRS) are used interchangeably in the Chapter, and this limits the picture of natural heritage presented.</li>   <li>• The physical condition and integrity sample of natural heritage is only drawn from the NRS. A sample of natural heritage places outside the NRS would complement and strengthen the assessment.</li>   <li>• The disaggregation in a number of the assessment tables leads to a large number of mini findings. A coarser analysis or a consolidation of findings would allow the reader to comprehend better.</li> </ul>	<ul style="list-style-type: none"> <li>• Noted and agreed as an issue requiring amendments and clarification, which has occurred, while noting that from a practical viewpoint the NRS necessarily features prominently.</li>   <li>• This is a fair criticism, and would be desirable for future SOE reporting at the national level, but is not feasible for the SOE 2011 report. It should also be acknowledged that this survey was innovative for this SOE report and represents an incremental improvement on previous approaches.</li>   <li>• This is a fair comment, but the problem is primarily within only one assessment table; management effectiveness in Section 4. The format used here (and in other tables) is a function of a scorecard approach being used across most themes in the SOE 2011 report. The prose ‘at a glance’ text in each section is directly targeted at rapid reader comprehension of key findings.</li> </ul>
<b>Reviewer #2 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• Overall the heritage chapter is a very good summary of key issues which makes strategic use of the often incomplete and inconsistent data to provide a balanced and perceptive review which should be helpful to decision makers and stakeholders.</li>   <li>• The majority of my detailed comments relate to issues which it may be apposite to include, briefly, if the author considers there is sufficient evidence to do so and time and space allows. They are not crucial to the finished product</li>   <li>• There are some data sets such as stats on ATSIHPA referrals, and on the number of NHL nominations processed which could very</li> </ul>	<ul style="list-style-type: none"> <li>• Noted. Thank you. The Chapter has been extremely challenging to complete owing to the use of a modified DPSIR framework developed for the natural environment and a lack of hard data. The Chapter therefore relies heavily on case studies and examples and focuses on things which are important to say, rather than merely lamenting what cannot be said.</li>   <li>• Noted. Agree with nearly all comments and have amended and augmented text where possible.</li>   <li>• These data were not available at the time of the peer review draft, but have now been included.</li> </ul>

<p>usefully be included and should be readily available from the Department.</p> <ul style="list-style-type: none"> <li>It has been a running theme in SOE reporting over the years that there does not appear to be a robust arrangement for the collection of data about heritage, even at a Commonwealth level <b>in the intervening period between reports.</b> Until this is rectified the data will continue to have significant flaws and gaps and makes the Committee’s task very difficult.</li> </ul>	<ul style="list-style-type: none"> <li>Agree. This is <u>the</u> largest challenge for national SOE reporting. It will be a major finding in the summary conclusions of the overall report. However, in this Chapter an attempt has been made to accept this shortcoming and make some clear and relevant findings on the basis of information that is available.</li> </ul>
Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>The chapter is broadly comprehensive and (based on my specific professional experience in the area of historic heritage) generally reaches reasonable and justifiable conclusions with reference to identification, pressures, risks and outlooks.</li> <li>Based on the evidence presented, it is difficult to really get a clear sense of condition and integrity, effectiveness of management, or resilience as a national perspective across natural and cultural heritage (and given the nature of the issues and evidence, this will always be very difficult)</li> </ul> <p>In the absence of convincing and consistent evidence, simplistic, broad scale, conclusions such as “<i>The current condition and integrity of Australia’s ‘listed’ heritage is generally good, with some deterioration evident over recent years</i>” should therefore be avoided or more fully discussed.</p> <p>Apparently conflicting key statements such as “<i>Australia is recognised internationally for leadership in heritage management</i>” and</p> <p>“<i>the systems we use to manage our heritage are cumbersome .... [and] inadequate</i>” need better resolution.</p> <p>Possibly one of the key findings is the (obvious) difficulty of making any comprehensive and substantiated national assessment of the state of the cultural environment within what is currently a varied/fragmented context.</p> <ul style="list-style-type: none"> <li>The underlying message is occasionally</li> </ul>	<ul style="list-style-type: none"> <li>Noted and agreed, with thanks.</li> <li>This is a fair criticism, which has been addressed where possible during the post peer review edit. As much of the data relies on examples and observations, it is inevitable that it will read in part as a set of perspectives.</li> <li>Where noted and feasible the text has been modified to provide clarification or comment on apparent conflicts and inconsistencies. This peer reviewer’s comments have been very useful in this regard. However, some juxtapositions and anomalies do remain; it is a complex and sometimes conflicting subject!</li> <li>This has been included in the Key Findings and is a necessary overall conclusion of the SOE 2011 report.</li> <li>Noted and agreed. The report has generally</li> </ul>

<p>disjointed, unclear, lacking in a concise/relevant focus, or repetitive. The chapter requires some further refinement of the text to address these points (as far as reasonably possible within the varied/fragmented context).</p>	<p>been amended in accordance with this peer reviewer's thoughtful and relevant comments.</p>
<p><b>Reviewer #4 - key points</b></p>	<p><b>Author response</b></p>
<ul style="list-style-type: none"> <li>• The author has done an excellent job of piecing together a well-argued narrative despite ongoing serious problems with data (section 4 is especially good and has used the proxy measures and processes very effectively). Until the heritage authorities across the country can agree to cooperate more effectively, the prospects for improvement are not encouraging.</li> <li>• While the methods used to supplement the poor data are supported and necessary, they do not allow the reliable reporting of trends over time. The limitations on the reporting on trends are regrettable.</li> <li>• The demise of the Register of the National Estate during the reporting period is a significant event that is not given sufficient attention in the text. Is there any data on the degree to which the places in the RNE have been picked up by State/Territory mechanisms? Likewise, the different stakeholder contributions made to the review of the heritage provisions of EPBC could have been brought into this snapshot, particularly in Part 4.</li> <li>• Within the subject of national leadership, the issues arising from the structures of Australian federalism could be examined in more detail. As with most structural arrangements, the creation and use of 3 spheres of government in relation to heritage protection and management creates both strengths and (in this case) observable weaknesses. Cooperative work by the Commonwealth and the States/Territories has not yet successfully addressed this in relation to cultural heritage. In this light, the lack of data from the States in several crucial areas is a relative weakness of the chapter (for</li> </ul>	<ul style="list-style-type: none"> <li>• Noted. Thank you; it has been a huge challenge.</li> <li>• This peer review report, although voluminous, has been exceedingly thorough and very helpful in tightening up language, meaning and logic in this Chapter.</li> <li>• Agreed. This is a fundamental and systemic issue with SOE reporting, manifest in differences between the jurisdictions, lack of Commonwealth leadership and inadequate commitment to data gathering and monitoring between reporting cycles.</li> <li>• This is an important comment and the deficiency identified by the peer reviewer has now been remedied.</li> <li>• Agreed. This issue has been expanded and the importance of national leadership has been brought into the key findings.</li> </ul>

<p>example, in relation to funding for heritage, grant funding programs, etc).</p> <ul style="list-style-type: none"><li>• The consideration of heritage – in all its aspects – as part of the policy agenda for climate change is a strength of this chapter. The observations about the need for sustainability tools (including rating systems) to more effectively incorporate the contribution of historic buildings are also important and well articulated.</li><li>• There are several areas noted where statements are not sufficiently substantiated by data and should be re-considered. However, these do not detract from the conclusions, which appear sound.</li></ul>	<ul style="list-style-type: none"><li>• Noted. Thank you. Perhaps this Chapter will help focus efforts on the need for more sensible ratings tools and approaches to ‘sustainability’?</li><li>• Agreed. Where noted, these have been qualified or amended.</li></ul>
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<b>Built Environment</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• <b>1.PRESSURE</b> Environmental pressures and impacts (I) typically derive from the interaction of 3 factors: Population, (P), Consumption (C) and Technology (T) vintage. The draft chapter did not delve significantly into the implications of future levels of high <i>population growth</i> on built environments; and did not deal appropriately with the issue of <i>resource consumption</i> as it relates to sustainability of the built environment and its resident population: <a href="http://www.publish.csiro.au/pid/6472.htm">http://www.publish.csiro.au/pid/6472.htm</a></li>   <li>• <b>2.STATE</b> The state of the built environment cannot be adequately represented using <i>qualitative data</i> based on sample surveys of resident opinion. This draft chapter has relied too heavily on a PCA survey, where questions of representativeness in sampling and replicability for future periods have not been addressed. Attempts to identify trends in <i>key 'condition' indicators of a quantitative nature</i> has previously been a focus for SoE reports. Data deficiencies have been a recurring issue raised in all previous SoE Human Settlements/Built Environment Reports – an issue that remains unresolved through to the present.</li>   <li>• <b>3.RESPONSE</b> Effectiveness of Built Environment Management is the 'response' element featured in this SoE report. The approach taken is to refer to three high level frameworks developed to assess urban performance (COAG 2009, KPMG 2010 and Australian Government 2011) . It is possible that the reviews of future urban performance foreshadowed in these reports (eg sustainability indicators, spatial reports, annual update to State of the Cities Report) will begin to provide data that monitors progress or lack thereof in urban development policies and programs. At the conclusion of a quinquennial state of environment report that involves a synthesis of pressures on and condition of the built</li> </ul>	<ul style="list-style-type: none"> <li>• Noted, although the principal author believes that these issues were dealt with at a level of detail commensurate with the overall purpose of the report.</li>   <li>• Quantitative data has been used wherever available. The author agrees that despite it being a recurring issue there remain significant gaps in data availability, which are noted throughout the chapter. The data from the PCA survey are relevant, timely and offer useful insights and this is why they have been used.</li>   <li>• It is agreed that the three high level frameworks mentioned could possibly lead to improved information on the effectiveness of management response that could be used in future reports. In regard to the current report, the assessment of the effectiveness of management is primarily concerned with the efficacy of the various elements of management rather than in providing ideas for how challenges may be met in the future (although the importance of innovation in meeting these challenges is noted). It is up to policy and other decision makers to determine appropriate policies to deal with these issues.</li> </ul>

environment, however, it is not unreasonable to expect some ‘response’ statements that relate to key areas where *innovation* is needed in order to deliver more sustainable and resilient urban environments. For example, the high level of liveability that characterises Australia’s current built environment and urban lifestyle is being achieved by levels of resource consumption that are also world-leading (7 ha/person versus 2 ha/person for world average). In a growing and urbanizing world this nexus is unsustainable and inequitable, and requires de-coupling. The challenge is: *how to wind back urban resource consumption in high income societies such as Australia* while maintaining liveability. Pathways to more sustainable urban development have been identified (but do not feature in the Built Environment chapter) : <http://theconversation.edu.au/no-sustainable-population-without-sustainable-consumption-1774>

These encompass: 1) innovation in urban planning and design (especially urban regeneration); 2) innovation in urban infrastructure technologies and 3) innovation in demand management of household resource use.

Sustainable urban development in Australia in the 21<sup>st</sup> century will depend on the extent to which the *existing built environment can be retrofitted* to reflect the realities of a resource constrained and carbon constrained world. The principal challenge will be regeneration of brownfield and greyfield precincts in the inner and middle suburbs of Australia’s large cities:

<http://www.sisr.net/documents/35.11 AHURI Greyfield FR.doc>

A pipeline of *innovative urban technologies* exists that are capable of delivering a more sustainable built environment. They include renewable and distributed energy; integrated urban water systems; active transport systems; eco-efficient buildings; and wireless broadband communication. The barriers to be overcome are considerable, but the benefits of transformation are a sustainable, resilient

<p>future:</p> <p><a href="http://www.publish.csiro.au/pid/5854.htm">http://www.publish.csiro.au/pid/5854.htm</a></p> <p><i>Voluntary behaviour change</i> relating to household urban resource consumption in high income societies such as Australia is illusory. Governments have a clear role here in relation to : information, pricing, regulation, incentives and education:</p> <p><a href="http://www.apo.org.au/commentary/can-voluntary-behaviour-save-our-environment">http://www.apo.org.au/commentary/can-voluntary-behaviour-save-our-environment</a></p>	
Reviewer #2 - key points	Author response
<ul style="list-style-type: none"> <li>• The report has brought together some good material but lacks a good basis for discussing settlements as its preferred approach using population and economic growth as the main drivers of negative impact is at the least simplistic but mostly is just wrong. Cities can simply deliver more negative impacts as they grow but in reality there are economies of scale and density that can make cities not only better places to live but also having reduced impacts as they have put that growth into better quality public transport, green buildings, better recycling and so on. The new Federal urban policy is much more along these lines.</li> <li>• The transport data used are a very good case in point. They only show a rather sad story of car dominance but Australian cities are showing a 7 year trend into reduced car use and dramatically growing public transport. The data on this needs to be shown and the causes discussed. Population and economic growth are not drivers of these changes.</li> <li>• Risk and Resilience are important additions to State of the Environment Reporting. However they should include risks associated with oil price vulnerability as they are an important part of Australian settlements. The Dodson and Sipe material on this should be included along with an account of how some local and state governments are beginning to consider oil vulnerability.</li> <li>• Biodiversity is poorly covered and the report</li> </ul>	<ul style="list-style-type: none"> <li>• Noted. It is considered that the report now provides a balance between the environmental challenges created by population and economic growth and the ways in which these can be mitigated.</li> <li>• Additional data and discussion on transport has been added.</li> <li>• Risks associated with oil price vulnerability have not been included as these are considered to be essentially social and economic in nature and do not pose a direct threat to the built environment.</li> <li>• Additional information on biodiversity has</li> </ul>

<p>claims ‘virtually no studies...’ have been done. This is wrong as each major city has a lot of data on biodiversity but they aren’t collected on a uniform basis to enable comparison; future work using the Singapore Biodiversity Index would enable comparisons to be made as has been done on around 50 cities worldwide.</p> <ul style="list-style-type: none"> <li>• The anti-density polemic in the report should be removed. It is not academically sound in the claims that are made and the kind of anecdotal material used is not helpful. The need for density increases in particular centres to create the Polycentric City is clearly enunciated in the Federal Government’s urban policy and has benefits for the environment as well as social and economic gain.</li> </ul>	<p>been included.</p> <ul style="list-style-type: none"> <li>• The report seeks to balance the pros and cons of urban density. There are strongly held views by experts on both sides.</li> </ul>
Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>• Some key claims are not adequately supported by the material presented.</li> <li>• Referencing and use of direct quotes without citation is problematic.</li> <li>• Discussion of the issue of urban sprawl needs to be included.</li> <li>• Data from state and city-based State of the Environment reports and the <i>State of Australian Cities 2010</i> report should be used.</li> <li>• The summary tables for each section often present conclusions that are not supported by evidence presented in that section.</li> <li>• The section on ‘Effectiveness of built environment management’ needs to be more evidence-based.</li> </ul>	<ul style="list-style-type: none"> <li>• Supporting material has been provided where relevant.</li> <li>• Referencing and citation included where relevant.</li> <li>• Additional information on the urban footprint has been included.</li> <li>• Relevant data from these reports has been used (but the data are sourced to their original source, and not the reports).</li> <li>• Supporting evidence has been added where appropriate.</li> <li>• Readily available evidence has been used.</li> </ul>
Reviewer #4 - key points	Author response
<ul style="list-style-type: none"> <li>• Need for more explicit treatment of the built environment in non-metropolitan areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Given the diversity of non-metropolitan built environments and a comparative (to metropolitan areas) lack of data, both of which make identifying ‘national’ trends difficult, and the fact that most Australians live in metropolitan areas, the chapter does tend to focus on metropolitan areas. A</li> </ul>

<ul style="list-style-type: none"><li>• Need for an explicit consideration of infrastructure.</li><li>• Need for more analysis of projections of future trends.</li></ul>	<p>particular exception is the material that is provided on the state of Indigenous communities.</p> <ul style="list-style-type: none"><li>• Additional information on infrastructure has been included in the management effectiveness section.</li><li>• Future trends on climate, population and economic growth are analysed in detail in the 'Drivers' chapter.</li></ul>
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<b>Coasts</b>	
<b>Reviewer #1 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• The report identifies the increasing pressures that are predicted to occur in coastal regions through urban expansion and climate change. Population growth together with climate change issues such as sea level rise, increased coastal water temperatures and increased extent and frequency of storm, drought and fire events is expected to lower the resilience of coastal communities. The need for increased resources to provide governments, industry and communities with the knowledge that they require to make informed adaptation decisions is urgent.</li>   <li>• Expansion of the population into newer pristine regions, especially associated with the current boom in mining, will need to be managed carefully as these are also regions which have been less well studied including the dynamics of the coastal ecosystems. Impacts due to increased activity in the coastal regions such as 4WDs, boating and fishing need to be understood.</li>   <li>• While there has been increased activity in the development of coastal governance and recognition for a simpler national approach (i.e. fewer departments to review conservation and development activities and agreed national guidelines), there still remains the need for this activity to reach consensus and be adopted.</li> </ul>	<ul style="list-style-type: none"> <li>• All points are noted.</li> </ul>
<b>Reviewer #2 - key points</b>	<b>Author response</b>
<ul style="list-style-type: none"> <li>• The coastal chapter provides a cross cutting narrative of the issues confronting coasts, drawing largely from the other relevant chapters in the SoE and some limited new information specific to coasts.</li>   <li>• There are a number of assertions that are not substantiated and need to be backed up with evidence, references and fuller explanations. Similarly I think there has been a relatively narrow review and use of the available literature.</li> </ul>	<ul style="list-style-type: none"> <li>• Yes.</li>   <li>• Done.</li> </ul>

<ul style="list-style-type: none"> <li>• The readability of the coastal chapter document could be improved structurally by (a) considering the pressures, state and trends and responses for an issue together, (b) clearer and more consistent use of subheadings.</li> <li>• Statements of definition and scope: what is defined as the coast, does it include islands, and Torres Strait and other protectorates.</li> </ul>	<ul style="list-style-type: none"> <li>• Some restructuring has been done; subheadings considered in restructure. Overall format to be consistent across whole report.</li> <li>• Some definitions now included. Some information also included in Marine chapter.</li> </ul>
Reviewer #3 - key points	Author response
<ul style="list-style-type: none"> <li>• Overall this is a carefully constructed chapter with generally comprehensive coverage of key environmental issues affecting Australia's coasts. Isolating coastal environments for special focus in the Australian SOE report provides a basis for more integrated analysis of coastal areas and may set a framework for more detailed and purposive data collection on the coastal environment in future. I concur with the author's / (s') assertion that there is currently insufficient data on coasts to enable more detailed assessment and monitoring. The chapter effectively addresses this problem by drawing on information presented elsewhere in the SOE report, and this helps synthesise and focus disparate sources of evidence as they relate to coasts. One major contribution this chapter could make may be to propose a series of key, benchmark indicators for future reporting on the state of coastal environments.</li> <li>• A strength of the chapter is that it attempts to demonstrate connections between social and economic pressures and the coastal environment, as well as the weaknesses and potential strengths of coastal governance arrangements as an opportunity for improved coastal environments in future. Detailed review comments on specific sections of the report focus on refining some of these sections, by highlighting some passages of text that are unclear, and pointing to assertions that require additional sources of evidence or explanation.</li> <li>• In reviewing the chapter, I have accepted evidence referred to from other sections of the SOE report without question as these are subject to separate peer review. Overall, the</li> </ul>	<ul style="list-style-type: none"> <li>• General points noted, with thanks. We have tried to make suggestions where possible.</li> <li>• Again, general points noted. Much of the text is now revised incorporating reviewers' suggestions.</li> <li>• All points noted; feedback appreciated.</li> </ul>

<p>presentation of biophysical issues for coastal environments (Section 2) is generally very clear and draws on key data indicators without presenting extraneous information. The maps and charts presented illustrate the key points in this section very well.</p> <ul style="list-style-type: none"> <li>• There are some additional issues / material / evidence not referred to in this chapter that might be included in the relevant sections. In summary, these additional matters include:             <ul style="list-style-type: none"> <li>○ More introductory information about ‘coasts’ ‘coastal environments’ and the ‘coastal zone’, as well as the problematic inter-jurisdictional issues surrounding these definitions in Australia; as well as a brief explanation of integrated coastal zone management and Australia’s commitment to ICZM as a framework or paradigm for coastal management;</li> <li>○ some remarks about the function of marine protected areas and their interrelationships with coastal management, biodiversity protection, and coastal industries / recreation;</li> <li>○ some recognition of issues associated with intensive agriculture and new agricultural industries that may present more environmental risks than in the past, versus new movements in some coastal areas towards local, sustainable food production as a deliberate economic strategy, with promising environmental benefits in future</li> <li>○ some additional discussion on the environmental problems associated with infrastructure for coastal settlements,</li> </ul> </li> <li>• Section 4 “Resilience, risks and outlook for coasts” might work better if it was somewhat restructured to present the discussion of risks before the discussion of resilience and responses to these risks.</li> </ul>	<ul style="list-style-type: none"> <li>○ Introductory information increased.</li> <li>○ MPAs are discussed in the Marine chapter.</li> <li>○ Such information now included.</li> <li>○ Information on infrastructure now included.</li> </ul> <ul style="list-style-type: none"> <li>• Chapter restructured.</li> </ul>
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Reviewer #4 - key points	Author response
<ul style="list-style-type: none"><li>• Overall, this is a very good chapter with emphasis on one of the key elements needing to be addressed in being the restructuring of governance and institutional arrangements relevant at all government levels of coastal management.</li><li>• It needs to be more specific in giving examples of what can be done as well as any data that may be available to support the suggestions.</li><li>• There needs to be more of a linking of the issues and recommendations to coastal environmental impacts.</li><li>• The Conclusions also need to be more specific.</li></ul>	<ul style="list-style-type: none"><li>• All points noted, with thanks. We have tried to give clear suggestions where possible.</li></ul>