#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
1	35047	25	0	0	0	0	The previous section on health was structured - observed impacts, projected impacts, adaptation. This would be a useful structurefor this section also. (David Griggs, Monash University)	The re-draft has re-arranged material to follow this general pattern, but in view of the compressed space without using a further level of sub-headings.
2	35048	25	0	0	0	0	The section rightly emphasises the adverse impacts and adaptation challenges faced by indigenous people as a result of climate change but only in the last few lines does it mention the role indigenous people can play in adaptiong to climate change. This should have more emphasis. (David Griggs, Monash University)	Paragraph 3 of the section now reports on Indigenous re-engagement with health issues to increase adaptive capacity, the integration of Indigenous observations on climate change, plus the likely livelihood changes which could come with engagement with greenhouse gas abatement and carbon sequestration activities.
3	35533	25	0	0	0	0	When I raised the second point above in a meeting of IPCC Expert Reviewers in Melbourne on 26 June 2012, Andy Reisinger noted that the authors must be very careful in how to incorporate such points because it is the sort of thing that governments do not like to see in IPCC assessment reports. Conversely, Australian government documents and the Garnaut Review (2008) indicate that coal-fired power plants contribute to carbon dioxide emissions and that coal mining results in some fugitive carbon dioxide emissions. Furthermore, Australian government documents and the Garnaut Review indicate that livestock production results in methane emissions. Indeed, I understand that livestock production is the main source of greenhouse gas emissions in New Zealand. Reference: Garnaut, Ross. 2008. The Garnaut Climate Change Review. Cambridge University Press. (Hans Baer, University of Melbourne)	Unclear what "the second point above" refers to. Reviewer's comments about GHG emission sources seem correct but are outside the mandate of WGII, and no specific changes are requested. No changes made.
4	36061	25	0	0	0	0	There does not seem to be consideration of increased global warming in the northern hemisphere being likely to cause migration to the southern hemisphere, particularly NZ, where migration of even a few hundred thousand (let alone millions) would have big impacts. A globally trivial influx of 5 million "climate refugees", eg from Europe or Asia, would double NZ's population and cause considerable stress on housing, food, water, electricity etc. (Brad Field, GNS Science)	Migration is dealt with based on existing literature in sections 25.3 and 25.9. As discussed there, significant climate change-driven migration is largely conjecture but not backed by detailed studies. Hence we feel the (slightly revised) discussion of inward migration is adequate and consistent with the evidence in the current literature.
5	36430	25	0	0	0	0	the vulnerability emphasis is questionable: occasionally the tenor changes, but the chapter is conceptualised as physical changes to which people are vulnerable. There is little recognition of resilience (G Wilson, Community Resilience and Environmental Transitions, Ashgate 2011). Recent work on human responses to disaster emphasises human resourcefulness (R Solnit, A Paradise Built in Hell: The Extraordinary Communities that Arise in Disaster: Penguin 2009). One could point to community/student responses to the Christchurch earthquakes. (Eric Pawson, University of Canterbury)	Our literature search found little material on resilience that is specific to climate change and to Australasia. Recovery from disasters is only one aspect of resilience and not necessarily the most relevant one for climate change adaptation, given that some impacts are gradual and do not necessarily manifest themselves in single large extremes such as the Christchurch earthquake. However, we have adjusted the perspective in individual sectoral assessments to more strongly bring out current resilience as a basis for then assessing vulnerability.
6	38276	25	0	0	0	0	Looking at figures and tables made for the different chapters, there are similarities (e.g. magnitude of temperature and rainfall changes, impacts on ecosystems...) between chapters because they have they deliver similar information, but for different regions. (Guillaume Simioni, INRA)	Agreed, no modification required.
7	38277	25	0	0	0	0	Having a similar layouts (i.e. same styles and legends, symbols, columns, colors, ...) accross the chapters, would help the comparison between regions. Not sure it is important, especially if the readership is different from one chapter to another. It's just a suggestion. (Guillaume Simioni, INRA)	Agreed and referred to TSU as this is a cross-chapter issue.
8	38651	25	0	0	0	0	The marine climate report card: Report Card of Marine Climate Change for Australia; detailed scientific assessment, ES Poloczanska, AJ Hobday & AJ Richardson (eds), NCCARF Publication 05/09, ISBN 978-1-921609-03-9, pp. 29-51. (http://www.oceanclimatechange.org.au/content/index.php/site/welcome/ may be useful for various "marine" parts of this chapter. This is the 2009 version and the 2012 update will be launched in August 2012 but I am unsure whether this will fall within the citeable literature constraints of AR-5. (Janice Lough, Australian Institute of Marine Science)	This is now cited in the SOD.
9	39060	25	0	0	0	0	I reviewed the Zero Order Draft (ZOD) of Chapter 25 and provided numerous recommendations - none of which appear to have been taken on board. I am very disappointed and rather disturbed that El Nino - Southern Oscillation (ENSO) is hardly dealt with at all in the First Order Draft (FOD), compared with a larger treatment in the Zero Order Draft. It appears that there may have been a change between the ordering of the CLAs - I don't know whether this has any bearing on how comments have been dealt with from the ZOD? As a result, I can only provide here an overall comment, since all of the specifics that I've already articulated to the ZOD seem to have been ignored - this is extremely frustrating for a reviewer and I'm disappointed in the process. I realise the FOD of Chapter 25 has been shortened significantly but to the expense of proper discussions about the dominant mode of climate variability for Australasia, which is ENSO, is of serious concern. At a bare minimum, I provide here reference details of a document about to be published that discusses ENSO in the context of Australia's marine environment which you may consider in the Second Order Draft. (Holbrook NJ, Brown JN, Davidson J, Feng M, Hobday AJ, Lough JM, McGregor S, Power SB, Risbey JS (2012). El Nino - Southern Oscillation. In A Marine Climate Change Impacts and Adaptation Report Card for Australia 2012 (Eds ES Poloczanska, AJ Hobday and AJ Richardson)). (Neil Holbrook, University of Tasmania)	Due to space limitations much of the content of of 25.3 has been shifted into a new table 25-1 which focuses on observed and projected changes for each variable. The main text for 25.2 is now very short, but it does now emphasise the role played by ENSO and other key models of variability in Australasian climate. In addition, WGI also includes a disucssion of the role played by these modes of variability in regional climate, which is also referenced in 25.2.
10	39081	25	0	0	0	0	SME Background report 29 Feb 2012 Final.pdf (emailed to wg2-ar5-supportingmaterial@ipcc-wg2.gov) (Pierre Mukheibir, University of Technology Sydney)	Thank you for pointing out this report. This is now cited in section 25.4 on adaptation.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
11	39083	25	0	0	0	0	Mukheibir – Adaptive planning for resilient urban water systems FINAL.pdf (emailed to wg2-ar5-supportingmaterial@ipcc-wg2.gov) (Pierre Mukheibir, University of Technology Sydney)	Thank you for pointing out this report. We feel this material is sufficiently covered in the material already cited in the draft.
12	41227	25	0	0	0	0	An overall coment on the planning issues, due to recent changes in state governmens there is already occurring a 'softening' of planning climate change in Vicotria, NSW and Queensland and this change needs to be refleted in the next draft in terms of any strong statements on embedding adaptation into planning processes; this chnage in not universal and the ACT and SA are examples where there continues to be a commitment to planning for climate change eg the ACT Climate Change Council and recent renewable energy intiatives such as the largest solar farm tender in Australia and SA new planning strategy (Barbara Norman, University of Canberra)	The fact that planning provisions change in response to changes in government is now noted in the revised draft.
13	41328	25	0	0	0	0	In general there appears to be an under-representation of the large part of Australia's land mass that is arid and semi-arid rangelands in Chapter 25. A focus on the more highly populated regions and more productive agricultural lands is consistent with impacts on human population and with the research base, but the risk of degradation and desertification due to the direct impacts of climate change and management (especially related to more severe droughts), would have serious impacts on indigenous communities, remote rural communities and economic viability of grazing industries. Even with a moderate increase in drought severity recovery time for vulnerable ecosystems would be extended with socio-economic consequences and increased risk of biodiversity. Higher risk of erosion, loss of habitat, and fragmentation of ecosystems would follow. There has been some work in this area (e.g. McKeon et al. 2008) but it could also be more clearly identified as a knowledge gap for Australasia. (Beverley Henry, Queensland University of Technology)	The lack of information on remote arid regions in Australia has now been noted as a key knowledge gap in section 25.11.
14	41487	25	0	0	0	0	This is in good shape for a First Order draft. The language is mostly clear and concise, the material is well organised, and apart froma couple of exceptions outlined below there are few gaps in coverage. (David Wratt, NIWA, New Zealand)	Noted, thank you.
15	41488	25	0	0	0	0	Observed and predicted changes in ocean pH and their potential impacts appear to have been largely overlooked. I accept that the Australasian literature on thes issues is limited, but I think there is enough to expand on the present treatment. Deepwater corals, an important ecosystem in this region which I understand to be particularly vulnerable to ocean acidification, appear to have been totally overlooked. See my comments below regarding Ch 25 Page 11 line 1 for some literature suggestions regarding pH changes, and P22 line 45 onwards regarding deep sea corals. (David Wratt, NIWA, New Zealand)	This issue is now mentioned in the coastal ecosystems section.
16	41489	25	0	0	0	0	In my view there are still some gaps in the treatment of projected changes in NZ freshwaters and their potential impacts. The author team might like to consider adding a CA who can assist with this. (David Wratt, NIWA, New Zealand)	The terrestrial & freshwater section has been additionally reviewed by Dr Matt McGlone at Landcare Research who considered that the topic had been reviewed as thoroughly as space constraints and the available literature allow.
17	41666	25	0	0	0	0	Or is the advance in the timing of migration of glass eels by several weeks in Waikato River, North Island, NZ (See Table 25 -1, FOD) one of these few impacts? (Lourdes Tibig, The Manila Observatory)	The example is in table 25-1
18	42297	25	0	0	0	0	Overall I find the FOD well written, clear, comprehensive and objective. Congratulations and thanks. I have only three substantive criticisms that are expounded in detail below, each of which can be rerlatively easily accommodated: (1) The dominating influence of ENSO on both Australia and NZ has been given scant attention and is likely to be a key driver of CC impacts. It follows that that changes in the frequency and intensity of La Nina and El Nino phases of ENSO (and related large scale climatic/oceanographic oscillations like PDO, IPO, SAM) is a key gap in our knowledge and ability to predict impacts. I urge you to highlight the gap; (2) Inadequate attention is given to the impacts of cc on the key invasive species that are restructuring New Zealand's ecosystems (possums, stoats, ferrets, rats, mice, introduced social wasps); (3) I can not agree that Australia is significantly more vulnerable to CC than New Zealand. Absence of evidence is not the same as evidence of absence. I am envious of the wonderful scholarship and beginnings of adaptation that is accelerating in Australia cf. NZ. When NZ finally gets its act together for impact and adaptation research, we may well find that aspects of NZ's social-ecological systems are just as vulnerable as in Australia, especially in biodiversity threats and coastal and offshore island impacts. I urge the authors to assert higher certainty of impacts in Australia than in NZ, but not certainty that the impacts themselves are any different between the nations. (Henrik Moller, University of Otago)	Thank you for the positive feedback. The point is well taken regarding the importance of potential synergies between invasive species and climate change. This has now been included as a key knowledge gap (Section 25.11).
19	42487	25	0	0	0	0	This chapter is in good shape. The authors have a done a great job. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Noted, thank you.
20	42587	25	0	0	0	0	Chapter 25: 'Australasia': I would again argue and add that I believe there is a lot of confusion in Australia (especially in agriculture and the media) over 'climate systems' in general. My own experience is that the media has now largely forgotten ENSO and most users in the public, industry, government, or media have no knowledge of the various types and scales of both the naturally occurring systems associated with higher frequency climate variability and especially no knowledge of, what could be termed, 'the intersection' of higher frequency systems (such as the MJO or ENSO) with the core lower frequency system of climate change. Indeed, many industry sectors had no knowledge of the development of recent major La Niña events, causing massive losses to their business (eg: ~$500m loss to the sugar industry in one year through lack of planning and inappropriate forward selling of sugar). The 'whole of climate system' needs to be provided and elucidated in WG2 documentation - or elsewhere as IPCC may consider. (Roger Stone, University of Southern Queensland)	The role of ENSO in regional climate is now highlighed in the (much shorter) text of 25.2. These issues are dealt with more extensively in WGI Chpater 14, which is also cited in section 25.2.
21	42590	25	0	0	0	0	no mention of the value of seasonal climate forecasts as an effective adaptation mechanism for agricultural users as they attempt to tackle longer-term (lower frequency) climate change. A useful reference can be found in Stokes and Howden (2008) : Stokes C.J and Howden, S.M (2008) 'An overview in climate change adaptation in Australian primary industries: impacts, options, and priorities' 346pp http://www.csiro.au/files/plhg.pdf (Roger Stone, University of Southern Queensland)	We have attempted to cover issues of incremental adaptation without having the space to document individual examples. However, we will further review whether to include this specific adaptation in the final draft.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
22	42702	25	0	0	0	0	Very comprehensive and clear review of the Australasian climate change situation and current response (Bruce Harris Small, AgResearch Ltd)	Noted, thank you.
23	44557	25	0	0	0	0	Sections 25.3.1 – 25.3.4: Temperature and precipitation observations and projections – Please update to ensure consistency and cross-referencing with relevant WGI AR5 chapters (including the Annex I: Atlas of global and regional climate projections) and the SREX Chapter 3 in regards to extremes. (Thomas Stocker, IPCC WGI TSU)	Consistency with SREX and WGIAR5 chapters has been checked, and cross reference included where appropriate.
24	44558	25	0	0	0	0	Section 25.3.5: Drought – Please update to ensure consistency and cross-referencing with relevant WGI AR5 chapters and the SREX Chapter 3. (Thomas Stocker, IPCC WGI TSU)	Consistency with SREX and WGIAR5 chapters has been checked, and cross reference included where appropriate.
25	44559	25	0	0	0	0	Section 25.3.6: Winds – Please update to ensure consistency and cross-referencing with relevant WGI AR5 chapters, and the SREX Chapter 3. (Thomas Stocker, IPCC WGI TSU)	Consistency with SREX and WGIAR5 chapters has been checked, and cross reference included where appropriate.
26	44560	25	0	0	0	0	Section 25.3.7: Sea Level – Note that the SREX Chapter 3 included an assessment on extreme sea level, and this should be referred to here. (Thomas Stocker, IPCC WGI TSU)	Consistency with SREX and WGIAR5 chapters has been checked, and cross reference included where appropriate.
27	44561	25	0	0	0	0	Section 25.3.9: Cyclones/storms – Insure that consistency is maintained as subsequent drafts of the WGI AR5 chapters 11 and 14 develop. (Thomas Stocker, IPCC WGI TSU)	Consistency with SREX and WGIAR5 chapters has been checked, and cross reference included where appropriate.
28	44562	25	0	0	0	0	FAQ 25.1: FAQ1 "How will climate change in Australasia?". We have serious concern with the the focus of this FAQ as the assessment needed to answer such a question is primarily within WG and the evidence past, present and future climate trends in the regions is covered in the WGI contribution to AR5. With the current focus of this FAQ, there is a serious risk here of cross-working group inconsistency and overlap that is best avoided. We thus suggest this FAQ to focus on the consequences of this for exposure, vulnerability, impacts, etc. (Thomas Stocker, IPCC WGI TSU)	FAQs have been revised fundamentally based on further discussions across WGII and guidance by the TSU. The originally FAQ-1 no longer exists.
29	45115	25	0	0	0	0	The structure of this chapter doesn't really allow a discussion of a few missing topics that could be considered for inclusion in an assessment that aims to draw some conclusions as well as to list findings: (i) any sort of systematic vulnerability assessment across sectors in Australia (also missing from the recent Productivity Commission study) let alone a systematic adaptation assessment across sectors - maybe this can only be observed as a gap; (ii) the degree to which a decision-centred approach to adaptation (as opposed to climate centred vulnerability assessment) is increasingly being seen as best practice in Australian sectors getting seriously into adaptation planning - see next comment line for elaboration; (iii) the real degree to which there are contested values and institutions where major changes are faced, and the slow realistation (backed up by cases studies of say Clarence City Council cf others) of how crucial engagement processes are to resolve these, and hence the emergence of a systematic matching of different methods to different problem types (e.g. see NCCARF project by Tim Capon reported at Melbourne Adaptation Conference); (iv) the implications and impacts of simultaneous extremes (whether simultaneous in time or space or both), and whether this literally is in the same location or time (as for storm surge, SLR an flooding), or within a jurisdiction and/or a budget year (as in fire in Vic at the same time as floods in WQld, or just many floods in one year) - work is just starting to explore these risks - forthcoming paper by Leonard et al. and (v) there is still a bit of a sense of shopping lists of impacts or adaptations in many sectors - it would be good to try to get beyond this to have some systematisation of why to what where when? I realise this is a challenge, but it would be good to ask 'so what' about these lists. Tables 25-2 and 25-5 are also a bit shopping listy - what are the emergent implications of these? (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	These are highly useful if challenging comments. (i) we consider that there is indeed no substantive literature on a systematic comparative vulnerability assessment, let alone adaptation assessment. The existing work being completed just in time for this draft is now reflected in the synthesis section of this chapter. (ii) reference to a decision-centric approach is included in the revised adaptation section (25.4), and also covered in a new FAQ drafted with the help of the reviewer; (iii) the issue of contested values is reflected explicitly in the adaptation section (25.4.2), expanded upon in the new psychology section (25.4.3), and revisited in the synthesis section. We have also expanded the assessment of the relevance of participatory processes, and include reference to recent work on decision-making frameworks (Randall et al, building on Tim Capon's work). (iv) the issue of compound events, and of coincident adaptation needs, is now included as an emergent risk in the synthesis section (we consider the literature too weak to make anything more of it, but we agree with the reviewer that this challenges posed by multiple events is important and sufficiently supported by studies and recent experiences. (v) we have tried to reduce the shopping list appearance wile being mindful that we can't and don't want to superimpose too much of our own judgement on evidence that has not been systematically analysed in the literature.
30	45116	25	0	0	0	0	Expanding on point (ii) above, there is no simple place in the chapter where integrated responses by a level of decision-making such as local government or regional groups (in the case of NRM) can be seen. Yet is worth noting, for example, that there are extensive emerging standards for adaptation planning for local governments emerging in Australia through the recently completed Coastal Adaptation Development Pathways programme funded by the federal Dept of Climate Change & Energy Efficiency, e.g. leading to documents promulgated in South Australia (Balston et al, maybe available from her - Jacqueline.Balston@unisa.edu.au - or the SA LOcal Govt Association), Tasmania (clive.attwater@sgsep.com.au), HunterValley NSW (Steve Wison, stevew@huntercouncils.com.au), etc. These regularly promote a decision-centred, iterative process that takes care not to get stuck on seeking unnecessary precision in the impacts and vulnerability assessment steps (see also UKCIP, etc). It would be useful to identify some of these emerging standards, also reflected in the thinking of the draft PROVIA Guidelines (http://www.provia-climatechange.org/ABOUT/PriorityActivities/Activity4/tabid/55274/Default.aspx). The evolving report from Bob Webb's ANU/NCCARF "Leading Adaptation Practies" project is worth tracking in terms of an enormous list of adaptation products, processes and websites in Australia, and potential for convergence in this diversity - it will report in time for WGII. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	The adaptation section now includes a paragraph discussing the value of regional approaches, and includes several references to recent guidance documents that consistently promote a more decision-centric approach to adaptation. The new table on adaptation constraints and enablers also draws heavily on Bob Webb's report and submitted paper.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
31	46520	25	0	0	0	0	The use of terms like detection, attribution, trend, warming and sea level rise. Chapter 18 suggests detection be only used when we are referring to a climate change signal (a change in the mean state that persists for an extended period). It would help if such a discipline was applied throughout WG II chapters. (Neville Smith, Bureau of Meteorology)	This suggestion is contrary to the use of the those terms by Chapter 18 and hence by other WGII chapters, where detection and attribution refer not just to climate change signals but crucially also to observed impacts. We have ensured our use of those terms in the SOD is consistent with the use and definition in chapter 18 and the WGII glossary.
32	51506	25	0	0	0	0	1) Overall -- In preparing the 2nd-order draft, the chapter team should prioritize making each section of the chapter a polished, comprehensive treatment of topics considered. From these sections, the chapter team is then encouraged to maximize the utility of its findings, ensuring that they are robust, compelling, and nuanced. Themes to consider informing in constructing findings include decisionmaking under uncertainty, risks of extreme events and disasters, avoided damages, and limits to adaptation. To these ends, the chapter team has prepared an incredibly solid first-order draft. To inform further chapter development, I provide a few general and specific comments below. (Katharine Mach, IPCC WGII TSU)	Noted, thank you, and taken into consideration as guiding principle for revisions in particular to sections 25.5 to 25.8.
33	51507	25	0	0	0	0	2) Highlighting key findings -- The author team has very effectively highlighted key findings across chapter sections, using calibrated uncertainty language to characterize its degree of certainty in these conclusions. As a result, a reader of the chapter can readily understand how the literature reviews and syntheses in chapter sections--the traceable accounts--support the conclusions of the chapter, in particular those presented in the executive summary. (Katharine Mach, IPCC WGII TSU)	Noted, thank you.
34	51508	25	0	0	0	0	3) Usage conventions for calibrated uncertainty language -- As done nearly everywhere in the chapter, calibrated uncertainty language should be italicized where used. For the second-order draft, the author team may wish to consider in some places in the chapter further parenthetical presentation of calibrated terms--at the end of clauses or sentences--to maximize the directness of wording in the conclusions. Finally, the author team should continue to avoid casual usage of reserved uncertainty terms. (Katharine Mach, IPCC WGII TSU)	Noted, thank you, and taken into consideration as guiding principle when responding to review comments and preparing the second order draft.
35	51509	25	0	0	0	0	4) Specificity of described observations and projections -- The author team is very much encouraged to continue presenting observed and projected impacts with the high level of specificity (and conciseness) already employed. (Katharine Mach, IPCC WGII TSU)	Noted, thank you, and taken into consideration as guiding principle when responding to review comments and preparing the second order draft.
36	51510	25	0	0	0	0	5) Figures and tables -- Table 25-6 is a perfect example of the effectiveness of visual media in communicating information and findings in an assessment context. The author team is strongly encouraged to develop more figures to complement the robust characterization of information provided in the chapter text. (Katharine Mach, IPCC WGII TSU)	Noted, thank you, we have added more figures in the SOD, including a conceptual figure on the adaptation process as evidenced by experience from the region.
37	51511	25	0	0	0	0	6) Coordination across the Working Group 2 contribution -- In developing the next draft of the chapter, the author team should consider treatment of topics not only in this chapter, but also across the report as a whole. For each topic, the chapter team should ensure that treatment here is reduced to the essence of what is relevant to the chapter, with cross-references made to other chapters as appropriate, also minimizing overlap in this way. (Katharine Mach, IPCC WGII TSU)	Noted, thank you, and taken into consideration as guiding principle for revisions in particular to sections 25.5 to 25.8.
38	51512	25	0	0	0	0	7) Harmonization with the Working Group 1 contribution to the AR5 -- At this stage of chapter drafting, the author team should carefully consider the working group 1 contribution. Wherever climate, climate change, climate variability, and extreme events are discussed, the chapter team should ensure that their treatment is harmonized with the assessment findings of working group 1. (Katharine Mach, IPCC WGII TSU)	Noted, thank you, and taken into consideration as guiding principle for revisions in particular to section 25.2 and Table 25-1.
39	52400	25	0	0	0	0	Clearly there is a very selective incorporation of relevant social science research in chapter 25, and the nature and ephemeral extent of such reference is a very serious problem and shortcoming. It must be very clearly stated that socio-economic and demographic considerations and evidence do not encompass social science, and there is scant reference to highly relevant national and international sources and bodies of work of crucial relevance to climate change impacts, adaptation, and vulnerability, including the perspectives of anthropology, political science, psychology, sociology, risk communication, cultural studies, media studies, psychosocial impact assessment, etc. It must also be clearly stated that health considerations relating to climate change impacts, adaptations, and vulnerability are not encompassed by the profession and disciplinary base of 'public health' and there are many aspects of the interdisciplinary area of health and social science, as with the interdisciplinary area of risk and social science, which are simply not canvassed, cited, or addressed in this chapter. This of course reflects, to a great extent, the absence of representation of these areas of expertise, and extensive bodies of relevant work, in the author membership of this chapter, and the extent to which this is a more general, very noteworthy, and consequential shortcoming of preceding IPCC Reports, and certainly the 2007 Report. (Joseph Reser, Griffith University)	The reviewer raises important and challenging points. After further review of the literature highlighted by the reviewer, the author team considered that many of the points are more appropriately dealt with in other Chapters of WGII (but also are dealt with in WGIII, chapters 2 and 3) as they are points of a generic nature with little place-based findings specific to Australasia. However, the authors accept the potential to expand and improve the discussion of psychological (as well as cultural and value-based) impacts and adaptation options. To this end, a new section 25.4.3 was included in 25.4 and the original Box 25-1 incorporated into this section. The reviewer was asked to act as contributing author for this section 25.4.3 for the SOD and accepted the invitation.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
40	52401	25	0	0	0	0	(Reser continued) Those sections of the chapter which ostensibly are devoted to 'human dimensions' and more substantive social science considerations of climate change impacts, adaptations, and vulnerability (25.4,25.5, 25.6.8,25.69, and 25.6.10) are, in my view, very problematic. Section 25.4 has no introduction or caveats about what is and what is not being covered here under this 'socio-economic' heading. The subheadings and content which follow those major sections or subheadings of the chapter which might conceivably address important areas of social science relevant omissions do not and probably cannot logically or meaningfully encompass such content, as they are premised on an understanding of social science, areas of relevant expertise and work, and selective levels of analysis, which effectively preclude genuine consideration of those missing social science areas referred to above. When the content that is there is closely examined, it is clear that statements refer to aggregate and general system levels, largely reflecting socio-economic and human geography considerations. Where fleeting reference is made to an individual or psychological level of analysis, e.g., "economic and social factors affecting individual ability to cope with and recover from, and plan for, natural hazards" (25.4.4, 11-13); "Australians generally perceive themselves to be at higher risk from climate change than New Zealanders and citizens of many other countries" (25.4.4, 19-20); and "beliefs about climate change and the risks it poses vary over time, are uneven across society and depend upon political preferences and gender, which can constrain or increase the willingness of communities and businesses to consider adaptation options" (25.4.4, 21-24), the statements and emphases reflect and reify the selective biases referred to above, and basically say nothing about individual level risk perceptions and subjective exposure and vulnerability; objective and subjective climate change knowledge, experienced concern or distress; psychological coping and adaptation responses; cognitive, emotional, and motivational processes underlying these perceptions and responses; the psychological impacts that the threat and its media coverage as distinct from physical environmental changes relating to climate change are having; behavioural engagement and the important self regulation as well as mitigation functions that are implicated, etc. Importantly, there is also no reference to how these variables might be interrelated and/or interdependent, and what mediating or moderating roles they might be playing with respect to climate change adaptation and impacts, as well as behavioural engagement. Nor is there reference to patterns of within-individual and community changes taking place in the Australian populace with respect to any of the above considerations or parameters, arguably a core consideration with respect to impacts, adaptation, and vulnerability. (Joseph Reser, Griffith University)	The original section 25.4 was not intended to cover psychological dimensions, but merely to describe socio-economic scenarios that could be of relevance to vulnerability assessments, and to discuss the degree to which that information is actually used in existing assessments. Given space constraints, we feel it is not justified to outline at the beginning of each section what it will and won't cover, as long as relevant material is covered in a sufficiently logical place. The addition of a new separate section on psychological, social and cultural dimensions as a new section 25.4.3 is intended to address the key of the reviewer's concerns, along with improved treatment of pscychological impacts and responses in the health section as well as the closing synthesis and key uncertainties sections. Literature on the importance of pscyhology for tourism impacts and adaptation to climate change is lacking and no reference were provided.
41	52403	25	0	0	0	0	(Reser continued) The section on human health addressing 'Sectorial assessments of impacts, opportunities, and adaptation options', 25.6.9 is arguably completely inadequate if this heading and coverage is being deemed to encompass more general health-related human impacts relating to non-clinical-or sub-clinical psychological and social impact considerations such as worry and concern, sub-clinical distress, experienced environmental stress, optimism/pessimism, maladaptive coping, psychological adaptation, temporal orientation, psychological preparedness, psychological resilience and individual level adaptive capacity, felt control, perceived self and collective efficacy, frustration, self and other responsibility attribution and associated guilt and blame, etc. The several sentences addressing mental health risks associated with extreme weather events ignore the multiple sub-clinical but adverse psychological impacts of an ongoing environmental stressor such climate change, the interactive impacts of these and other related environmental stressors and impacts, and cumulative and very consequential individual and community level psychological impacts in terms of altered perceived and experienced quality of life and environment, with these latter being very sensitive and measurable indicators of health and environment related environmental impacts of both the threat and unfolding environmental impacts of climate climate change. It is noteworthy, though this chapter does not explicitly mention it, that Australia was deemed the country, out of an 18 nation cross-nation study, to be most pessimistic about the environmental prognosis for Australia. (Joseph Reser, Griffith University)	Accepted, and psychological dimensions are now included in the revised draft, to the extent that they are significant and are not covered by the new section 25.4.3. Also a cross-reference is made from the health section to 25.4.3.
42	52404	25	0	0	0	0	(Reser continued) Many residents of the most pessimistic country, Australia, believe their country is facing considerable environmental challenges, despite their high environmental sustainability score (ESI). Australians seem to believe that although they are reasonably well off right now, the future is bleak: widespread perceptions are that the country's river systems are drying up, the major cities are running out of fresh water, bush fires are increasing, and most electricity is generated by highly polluting coal (Gifford et al., 2009). (Joseph Reser, Griffith University)	Noted, and this is consistent with the first para of Box 25-1. These points have been incorporated under the contributing authorship of the reviewer in the new section 25.4.3.
43	52405	25	0	0	0	0	(Reser continued) While there may not exist good research data within Australia and New Zealand for some of these important areas and indicators of adverse psychological impacts, it interesting to note that many authors and sources have not been cited (e.g., Bulkeley, 2000; Fielding, 2009; Fielding et al, 2010, 2012; Gosling & Williams, 2010; Gow, 2009; Hamilton, 2010; Higginbotham et al, 2010, 2012; Hoegh-Guldberg, 2010; Lewandowsky, 2011; Lewandowsky et al, 2012; Milfont et al., 2012; Morrissey & Reser, 2007; Reser, Bradley & Ellul, 2012; Searle & Gow, 2010; Syme, 2004; Syme & Dodds, 2007; Whitmarsh, O'Neil & Lorenzoni, 2011), nor do the submissions and views of professional bodies such as the Australian Psychological Society or the New Zealand Psychological Society appear to have been taken into account (e.g., Reser et al., 2007; Reser, Burke & Gridley, 2008a,b; APS, 2010). (Joseph Reser, Griffith University)	Partially accepted. Many of the articles cited by the reviewer are authored by Australasian scientists but do not report place-based findings from Australasia relevant to risk perceptions, impacts or adaptation. Many of the articles are generic and draw inferences, but do not report place-based findings. The references that do report relevant findings have been incorporated into the new section 25.4.3.
44	52406	25	0	0	0	0	It is extraordinary that under the heading of 'Adaptation' in this section, 25.6.9.3, there is no reference to within-individual adapt(Reser continued) ation to climate change, that is, to factors, parameters, processes, and psychological dynamics and impacts that relate to changes in thinking, feelings, understandings, and responses to the threat of climate change, which in turn powerfully mediate behavioural and community adaptation to climate change, and the psychological adaptation costs and impacts of climate change. It is clear that 'health' is being treated exclusively as 'public health', and adaptation in exclusively structural and system terms (e.g., Aspinwall, 2012; Folkman, 2012;.Reser & Swim, 2011; Reser et al., 2012b). (Joseph Reser, Griffith University)	Accepted, and key findings related to these perspectives are now included in the revised health section 25.8.1.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
45	52407	25	0	0	0	0	(Reser continued) The chapter has many positive aspects with respect to advances in natural and physical environmental science findings and projections, and reference to expert summaries, for unfolding climate change and extreme weather dynamics and impacts for Australia and New Zealand. But there is actually very little here in terms of Australian - or relevant international – research findings addressing Australian or New Zealand public risk perceptions, understandings, responses to, or impacts of the threat and accelerating environmental impacts of climate change either globally or nationally. This is very surprising given that such psychological and social science perspectives on climate change impacts, adaptation, and vulnerability are clearly crucial to informed and effective policy decisions and initiatives, to public engagement, and to credible and sensitive measuring, monitoring and documentation of important human response changes and impacts in the context of climate change. This is doubly surprising given that there a number of senior social scientists, including psychologists, who have been undertaking and reviewing such climate change specific research in Australia and New Zealand, and with collaborative partners overseas, for the past five years, with most of these researchers having much longer involvement in social science-based environmental research and applications for much of their professional careers. There also exist a number of nationwide longitudinal and repeated cross-sectional national climate change surveys which have been undertaken by social scientists in Australia over the past four year period, and a substantial amount of this work and research findings are available in research reports, articles, and book chapters. In addition overviews of relevant disciplinary research addressing public perceptions of and responses to climate change have been published in anthropology, psychology, sociology, political science, and the interdisciplinary field of risk research (e.g., . Yet there is virtually no passing or substantive reference to this convergent body of work, as it might apply to Australia or New Zealand, in the present draft chapter. (Joseph Reser, Griffith University)	These points are now addressed, to the extent possible within page constraints, in the new section 25.4.3. The authors felt that to justify inclusion, material had to report place-based findings from Australasia and be relevant to climate change risk perceptions, imapcts or adaptation. A wider discussion of how general risk perceptions may influence climate change responses would not be justified within the page constraints and mandate of this regional chapter. The reviewer's comments have been forwarded to other more conceptual WGII chapters for consideration (particularly chapters 2 and 16).
46	52408	25	0	0	0	0	(Reser continued) The brief reference to vulnerability in human and managed systems at 25.9, 45-52 is to some extent accurate for Australia, but arguably misrepresents the international social science investment, in global environmental change over the past 30 years, including in Australia (e.g., Bechtel & Churchman, 2002; Bell et al., 2001; Chen, Boulding & Schneider 1983; Dunlap & Michelson,2002; Gardner & Stern, 2002 2008; Gifford, 2007; Stokols & Altman, 1987; Lever-Tracy, 2010; National Research Council, 1992; 1999; 2010 a,b,c), and really misses an important part of the reality of current research databases and platforms, at least in Australia (Leviston et al, 2011; Reser etal., 2012b). “Yet research into psychological, social and cultural dimensions of vulnerability and there potential change over time is only emerging and poorly integrated with quantitative bio-physical studies.” This research is not just emerging in the international context. Such research has been a strong part of environmental psychology and environmental social science for decades, and climate change has been an important research priority since early 1980 (e.g., Chen, Boulding & Schneider, 1983; Stokols & Altman, 1987). What unfortunately has been the case is that many aspects and applications of the social sciences in the environmental domain, and additional bodies of work of particular relevance to psychological adaptation and psychological impacts, have not been well known to many climate change scientists, nor has an individual level of analysis, nor more social and cultural forms of risk appraisal, sense making, representation, and response been adequately considered in the climate change science research arena. (Joseph Reser, Griffith University)	Structure and emphasis of 25.9 (now 25.11) has been revised based on this and several other comments, and the issue has also been taken up in the revised section 25.4.3. However, the authors reject the notion that the large body of international literature is relevant to the scope of the Australasian regional chapter. Wording has been included that highlights the need to apply an increasingly consistent message from international literature to the Australasian context.
47	52409	25	0	0	0	0	(Reser continued) One need only look at the relative proportion of coverage, citation, and discussion of how people, individually and collectively, are perceiving, making sense of, understanding, responding to, and being impacted by the threat and unfolding impacts of climate change in this chapter, other chapters, and in previous IPCC Reports to appreciate that this is simply and wholly inadequate. Counter arguments to the effect that socioeconomic and systems approaches are addressing these more ‘social science’ considerations reflects a profound misunderstanding of the diversity and nature of social science and its myriad interfaces with the health sciences and the humanities, and why and how these perspectives are crucial in addressing human responses and adaptations to climate change, and the impacts of the threat of climate change on human populations. (Joseph Reser, Griffith University)	We have forwarded the reviewer's comments to key chapters 2 and 16 with a recommendation that this generic concern be addressed to the extent possible within those generic chapters. The authors of chapter 25 feel unable to address this concern within a chapter that is clearly focused on Australasia.
48	52410	25	0	0	0	0	(Reser continued) It is extremely difficult to surgically insert crucial missing pieces relating to psychological and other social science considerations in this Australasian chapter, given the existing organisation and headings, and the fact that these reflect a very selective and arguably blinkered view of the human considerations which need to be taken into account with respect to ‘impacts, adaptation, and vulnerability’. As well the very understanding and use of what are in fact core constructs and processes in the social sciences such as vulnerability, adaptation, impacts, values have not been informed by the meaning and use of these terms, constructs, and processes in the social sciences in the present chapter and this makes cogent contributions from social scientists very challenging. Notwithstanding this situation some effort must be made to do bring psychology and social science perspectives and relevant research findings in from the cold in chapter 25, and in the fifth report as a whole. The chapter organisation in section 25.6 of the report, for example, could well have included headings on ‘psychological and behavioural responses’, ‘psychological and social adaptations and impacts’, and/or ‘environmental stressors and responses’ independent of Tourism (25.6.10), Human health (25.6.9) and (Indigenous people (25.6.10). Again these existing headings simply cannot accommodate the more general but crucial psychological and social processes considerations which are currently missing. (Joseph Reser, Griffith University)	We accept the difficulty of 'surgical insertions'. A new section 25.4.3 was added to better address those points in a coherent fashion, along with an improved treatment of psychological dimensions in the health section (now 25.8.1). The authors reject the option of a more wholesale restructuring since other comments were highly complimentary to the structure and balance of the report, and a fuller restructuring would very likely create new imbalances and gaps that would be difficult to deal with in the one remaining expert review round.
49	52411	25	0	0	0	0	(Reser continued) I write as an applied environmental, social, health, and cross-cultural psychologist with extensive cross-disciplinary experience across the natural and social sciences. In brief, and concretely, there is simply no adequate or substantive coverage of public risk perceptions, understandings, or psychological (including behavioural) responses to, or the psychological impacts of, the threat of climate change, nor a section(s) or heading(s) under which such considerations could reasonably come. (Joseph Reser, Griffith University)	New section 25.4.3 has been added to allow a more focused and coherent discussion of those issues.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
50	52412	25	0	0	0	0	Referencing notes relating to the references cited in this chapter and in review comments on chapter 15 (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.
51	52415	25	0	0	0	0	References already cited in draft chapter 25 have not been listed in the present reference listing. (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.
52	52416	25	0	0	0	0	References and sources cited: Australian Psychological Society (APS) (2010) Psychology and Climate Change: A position Statement prepared for the Australian Psychological Society. Melbourne, Vic: Australian Psychological Society. Aspinwall, L.G. (2011) Future-oriented thinking, proactive coping, and the management of potential threats to health and well-being. In S. Folkman (Ed) The Oxford handbook of stress, health, and coping (pp 334-365). New York: Oxford University Press. Australian Psychological Society. (2010). Psychology and climate change: A position statement prepared for the Australian Psychological Society. Melbourne, Vic: Author. Baserman, M.H., Messick, D.M., Tenbrunsel, A.E. & Wade-Benzoni, K.A. (Eds) (1999) Environment, ethics, and behaviour: The psychology of environmental valuation and degradation. San Francisco: New Lexington Press. Bechtel, R. B. & Churchman, A. (Eds) (2002) Handbook of Environmental Psychology. New York, NY: Wiley. Brewer, J. F. (2008). New directions in climate change vulnerability, impacts, and adaptation assessment: Summary of a workshop. Washington, DC: National Academies Press. Brulle, R. J., Carmichael, J., & Jenkins, J. C. (2012). Shifting public opinion on climate change: An empirical assessment of factors influencing concern over climate change in the U.S., 2002-2010. Climatic Change, DOI 10.1007/s10584-012-0403-y Bulkeley, H. (2000). Common knowledge? Public understanding of climate change in Newcastle, Australia. Public Understandings of Science, 9, 313-333. Chen, R. S., Boulding, E., & Schneider, S. H. (1983). Social science research and climate change: An interdisciplinary appraisal. Hingham, MA; Kluwer Academic Publishers. Evans, G. W., & Cohen, S. (1987). Environmental stress. In D. Stokols & I. Altman (Eds.), Handbook of environmental psychology (Vol 1: pp. 571-610). New York: Wiley. Evans, G. W., & Stecker, R. (2004). The motivational consequences of environmental stress. Journal of Environmental Psychology, 24, 143-165. Dunlap, R.E. & Michelson, W. (Eds) (2002) Handbook of environmental sociology. Santa Barbara, CA: Greenwood Press. (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.
53	52417	25	0	0	0	0	Fielding, K. S. (2009). Youth and the environment survey: A report on the environmental attitudes, knowledge, and practices of 12 to 24 year old Queenslanders. Retrieved from Queensland Youth Environmental Council website: http://www.qyec.org.au/survey.html Fielding, K. S., Head, B. W., Laffan, W., Western, M., & Hoegh-Guldberg, O. (2012). Australian politicians' beliefs about climate change: The roles of political partisanship and political ideology. Brisbane, Queensland: Institute for Social Science Research, The University of Queensland. Fielding, K. S., Thompson, A., Winnifred, L. R., & Warren, C. (2010). Environmental sustainability: Understanding the attitudes and behaviour of Australian households AHURI final report. (Report No. 152). Melbourne: Australian Housing and Urban Research Institute. Folkman, S. (Ed) (2011) The Oxford handbook of stress, health, and coping (pp 334-365). New York: Oxford University Press. Gardner, G. T., & Stern, P. C. (2002). Environmental problems and human behaviour (2nd ed.). Boston, MA: Pearson Custom Publishing. Gardner, G. T., & Stern, P. C. (2008). The short list: Most effective actions U.S. households can take to limit climate change. Environment, 50(5), 12-25. Gifford, R. (2007) Environmental psychology: Principles and practice. Colville, WA: Optimal Books. Gifford, R., Kormos, C., & McIntyre, A. (2011). Behavioural dimensions of climate change: drivers, responses, barriers, and interventions. WIREs Climate Change, 2, 801-827. Gosling, E., & Williams, K. J. (2010). Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. Journal of Environmental Psychology, 30(3), 298-304. Gow, K. (Ed.), (2009). Meltdown: Climate change, natural disasters and other catastrophes – Fears and concerns for the future. New York: Nova Science Publishers. Hamilton (2010) Requiem for a species: Why we resist the truth about climate change. Crows Nest, NSW: Allen & Unwin. (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
54	52418	25	0	0	0	0	Higginbotham, N., Connor, L., & Baker, F. (2012). Regional risk perceptions: Longitudinal study of climate change adaptation in coastal versus agricultural areas of the Hunter Valley, NSW. Callaghan: University of Newcastle, School of Medicine & Public Health. Higginbotham, N., Freeman, S., Connor, L. & Albrecht, G. (2010) Environmental injustice and air pollution in coal affected communities, Hunter Valley, Australia. Health & Place, 16, 259-266. Hoegh-Guldberg, O., Fielding, K. S., Head, B., Laffan, W., & Western, M. (2010). Political leaders and climate change. The University of Queensland available from: http://www.issr.uq.edu.au/sites/default/files/PLCCI-report-Kelly-Fielding.pdf Krosnick, J. A., & MacInnis, B. (2011). National survey of American public opinion on global warming. Stanford, California: Stanford University with Ipsos and Reuters.. Leiserowitz, A., Maibach, E., Roser-Renouf, C., Smith, N., & Hmielowski, J. D. (2011b). Climate change in the American mind: Americans' global warming beliefs and attitudes in November 2011. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. Retrieved from http://environment.yale.edu/climate/files/ClimateBeliefsNovember2011.pdf. Lever-Tracy, C. (Ed) (2010). Routledge handbook of climate change and society. London: Routledge. Leviston, Z., & Walker, I. A. (2010). Baseline survey of Australian attitudes to climate change: Preliminary report. Canberra: CSIRO. Leviston, Z., & Walker, I. A. (2011). Second annual survey of Australian attitudes to climate change: Interim report. Canberra: CSIRO. Leviston, Z., Leitch, A., Greenhill, M., Leonard, R., & Walker, I. (2011). Australian's views of climate change. Canberra: CSIRO. Lewandowsky, S. (2011). Popular consensus: Climate change set to continue. Psychological Science, 22, 460-473. Lewandowsky, S., Gignac, G., & Vaughan, S. (2012). Climate science is not alone: The pivotal role of perceived scientific consensus in people's acceptance of science. Proceedings of the National Academy of Sciences. Retrieved from wwwpnas.org/cgi/doi/10.1073/pnas.0709640104 (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.
55	52419	25	0	0	0	0	Milfont, T. L., Harre, N., Sibley, C. G., & Duckitt, J. (2012). The climate change dilemma: Examining the association between parental status and political party support. Journal of Applied Social Psychology, in press. Morrissey, S.A. & Reser, J.P. (2007) Natural disasters, climate change and mental health considerations for rural Australia. Australian Journal of Rural Health, 15, 120-125. National Research Council (1992). Global environmental change: Understanding the human dimensions. Washington, DC: National Academy Press. National Research Council. (1999). Global environmental change: Research pathways for the next decade. Washington, DC: National Academy Press. National Research Council. (2010a). Advancing the science of climate change. Washington, DC: National Academy Press. National Research Council. (2010b). Limiting the magnitude of climate change. Washington, DC: National Academy Press. National Research Council. (2010c). The importance of common metrics for advancing social science theory and research: A workshop summary. Washington, DC: The National Academies Press, Division of Behavioral and Social Sciences and Education. Nelson, D. R., West, C. T., & Finan, T. J. (2009). Introduction to "In focus: Global change and adaptation in local places". American Anthropologist, 111(3), 271-274. Pettenger, M. E. (2007). The social construction of climate change: Power, knowledge, norms, discourses. Aldershot, England: Ashgate Publishing. (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.
56	52420	25	0	0	0	0	Reser, J. P., & Bentrupperbäumer, J. M. (2001). Reframing the nature and scope of social impact assessment: A modest proposal relating to psychological and social (psychosocial) impacts. In A. Dale, N. Taylor, & M. Lane (Eds.), Social assessment in natural resource management institutions (pp. 106-122). Collingwood, Victoria: CSIRO Publications. Reser, J. P., Bradley, G. L., & Ellul, M. C. (2012a). Coping with climate change: Bringing psychological adaptation in from the cold. In B. Molinelli & V. Grimaldo (Eds.), Psychology of coping: New research. Hauppauge, NY: Nova Science Publishers. Reser, J. P., Bradley, G. L., Glendon, A. I., Ellul, M. C., & Callaghan, R. (2012b). Public risk perceptions, understandings, and responses to climate change in Australia and Great Britain. Gold Coast: Griffith University, National Climate Change Adaptation Research Facility. Reser, J.P. Burke, S. & Gridley, H. (2008a) Submission to the Strategic Review of Climate Change Programs. Australian Government Department of Finance and Deregulation. Melbourne: Australian Psychological Society. Reser, J.P., Burke, S. & Gridley, H. (2008b) Submission to the National Climate Change Adaptation Facility regarding the National Adaptation Research Plan: Disaster Management and Emergency Services. Melbourne: Australian Psychological Society. (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.
57	52421	25	0	0	0	0	Searle, K., & Gow, K. (2010). Do concerns about climate change lead to distress? International Journal of Climate Change Strategies and Management, 2(4), 362-379. Stokols, D. & Altman, I. (Eds.) (1987), Handbook of environmental psychology (Vols I & II). New York: Wiley. Reser, J.P., Bragg, E., Hall, R., Ross, H., Syme, G., Winter, D., Schultz, W. & Uzzell, D. (2007) Psychology and the natural environment: A position statement prepared for the Australian Psychological Society. Melbourne, VIC: Australian Psychological Society. Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., Stern, P. & Weber, E. (2011) Psychological contributions to understanding and addressing global climate change. American Psychologist, 66 (4) 241-250. Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., Stern, P. & Weber, E. (2009) Psychology and global climate change: Addressing a multi-faceted phenomenon and set of challenges. http://www.apa.org/releases/climate-change.pdf Washington, D.C.: American Psychological Association. Syme, G.J. (2004) Sustainability in urban water futures. In P. Troy (Ed) Troubled waters: Confronting the water crisis in Australian cities (pp 99-217) Syme, G.J. (2007) The role of communicator and attitudes research in the evaluation of effective resource management arrangements. In K. Hussey & D.S. Dovers (Eds) Managing water for Australia: The social and institutional challenges. Collingwood, Vic: CSIRO Publishers. Whitmarsh, L., O'Neill, S. & Lorenzoni, I. (2011) Engaging the public with climate change: Behaviour change and communication. London: Earthscan. (Joseph Reser, Griffith University)	Noted and used, to the extent that they are applicable to the scope of this chapter and required to support key conclusions, in drafting of new section 25.4.3 as well as revisions to the health section.
58	53570	25	0	0	0	0	When presenting projected impacts, please include the time frame, scenario, and other assumptions. This is done in most instances but is missing in a few, including in the Executive Summary. (Kristie L. Ebi, IPCC WGII TSU)	Noted and taken into account in revisions.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
59	53571	25	0	0	0	0	Please check consistency of statements with those in the relevant sectoral chapters, such as food systems, coastal zones, and human health. (Kristie L. Ebi, IPCC WGII TSU)	The authors checked consistency and adjusted wording where this appeared necessary and justified, given the often different context and geographical scope of findings presented in the sectoral chapters. This does not ensure complete consistency though since those chapters are also undergoing further revisions towards the SOD.
60	54532	25	0	0	0	0	GENERAL COMMENTS: I would like to thank the authors for their work on a very impressive FOD. When considering the expert review comments received on your chapter and the next round of revisions, I suggest several overall priorities, for many of which you are already ahead of the curve. (1) Keep in mind that the preparation of the SOD is the time to ensure that each section of the chapter presents a comprehensive treatment of relevant literature, and that the Executive Summary presents findings that capture the key insights that arise from the chapter assessment. (2) This is also the time to focus on distilling the chapter text, not just fine-tuning wording but editing with a critical eye to improving quality by making discussions succinct and synthetic, while still being comprehensive. (3) Cross-chapter coordination is also important at this stage, as it should now be possible to identify topics that overlap with other chapters and to coordinate with other chapter teams to minimize that overlap. (4) Cross-Working Group coordination is important as well, and relevant chapter sections should cross-reference chapters from the other Working Groups, particularly in the case of statements about changes in mean or extreme climate conditions that are assessed in the contribution of Working Group I. (5) Continue to look for opportunities for the creation of figures that synthesize across results from the literature. (Michael Mastrandrea, IPCC WGII TSU)	Noted, thank you, and taken into consideration as guiding principle when responding to review comments and preparing the second order draft.
61	54533	25	0	0	0	0	EXECUTIVE SUMMARY: The author team has developed a robust and effective Executive Summary, including clear attention to providing traceable accounts, and calibrated uncertainty language. In the next round of revisions, I suggest considering a few adjustments to the very effective presentation of regional key risks. Given the presentation of the second category of bullets as having the potential to be moderated or delayed by mitigation and adaptation, it would be very useful to include somewhat more detail about these potentials to the extent that information is available. For example, the first three bullets present seemingly sizeable constraints or limits to adaptation, and I can't say that I get the impression from the current wording that there is high confidence in adaptation and mitigation being able to moderate or delay impacts. The last bullet provides more of an impression that adaptation can effectively moderate or delay impacts. For the first three, it would be useful to understand better the author team's view of the potential for adaptation to moderate or delay impacts, as indicated in the color bars in the excellent Table 25-6. In this context, the discussion in section 25.8.3 related to moving from incremental to transformative adaptation may be useful to incorporate as well. And for all four bullets, it would be useful to understand the extent to which the magnitude of impacts be reduced or delayed by mitigation (again as such information is available). (Michael Mastrandrea, IPCC WGII TSU)	The presentation of key risks has been revised based on this and other comments in the executive summary and underlying text (25.10.2 and 25.10.3), with a clearer argument for where and what kind of adaptation (transformative, rather than incremental) can help adapt to those key risks.
62	49281	25	1	0	94	0	Chapter heading: Australasia is usually taken to be the region of Oceania comprising Australia, New Zealand, the island of New Guinea, and neighbouring islands in the Pacific Ocean. I assume that somewhere this is redefined for IPCC purpose, otherwise Chapter does a huge disservice to a country like New Guinea. (Graeme Pearman, Monash University)	Indeed Australasia was defined for us by the IPCC. New Guinea (as a whole) is to be treated in the Asia Chapter
63	49282	25	1	0	94	0	a. Note that in referring to stream flow "gL" stands for "giga" and should be capitalised as for International Standard Units. b. Also note that on a number of occasions when referring to units, there should be a space between the numerals and the units, e.g. "321 m". (Graeme Pearman, Monash University)	Noted and attempted to ensure consistent use of units in SOD. However, these issues will also be picked up in copy-editing of the final draft.
64	49283	25	1	0	94	0	References: I have several queries concerning the citations in this Chapter which may or may not have been dealt with more generally in the preparation of the IPCC 5AR. They include: a. Despite the fact that this is a zero order draft it was made difficult for the reviewer to link the text to particular references when there seemed to be a highly variable process in listing references that appear under the name of a single author. For example, the references under the first authorship of Cai, do not seem to follow a logical chronological or offer medical order. This appears in a number of cases. i. Consider Balderstone 2011. This is listed as a Draft; there is no indication of the institution underpinning this report or that the paper was subject to peer review. ii. The second set of examples involves planning documents of particular communities, e.g. the Byron Shire Council. As a reader one has no idea of who performed these assessments, the quality of the work and the degree that was subject to review. iii. The third category involves reports prepared, presumably under contract to government departments or institutions such as the National Institute of Water and Atmospheric Research New Zealand or CSRO in Australia, where again the conditions under which the contract was taken, the degree to which the work was reviewed, what scientists actually did the work, is not demonstrated. Of course both these institutions chosen here as examples have significant reputations, however the reputation of an institution does not guarantee the reputation of his work. iv. A few other examples relates to private contract work. Again, it is difficult to assess the degree of rigour and review subjected that this work was subject to. Further, it is difficult to evaluate the degree to which the Chapter authors have been able to adequately capture the non-academic research and publications that have been produced, particularly by companies and non-government institutions. v. Finally, there are a few instances where overview documents are frequently referred to, e.g. Steffen et al. It might be better to refer to the work upon which the overview was based; that is go to the original peer reviewed work. (Graeme Pearman, Monash University)	Order of referencing has been made consistent. The Balderstone reference does not appear in our draft - not sure what the reviewer refers to? Planning documents and related technical reports consistitute important references for understanding local-scale impacts and adaptation responses and have been treated consistent with the IPCC guidance on grey literature. We consider recent and authoritative reviews an appropriate source provided that it considered the relevant individual publications.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
65	49284	25	1	0	94	0	Language: It is surprising to what degree terminology, languages and acronyms become embedded within some disciplines of science. For an IPCC assessment it would be better to avoid this as much as possible. The following are just a few examples which will point to the reviewer's concerned but by no means comprehensively address all problems that appear in this regard in the text. a. Throughout the text the US spelling of "modelling" and "modelled" is used. Presumably this is a decision of IPCC, although some would regard the English spelling to be more appropriate. b. Throughout the text when referring to "sea level rise" and to "greenhouse gas increases" no hyphenation of "sea-level" of greenhouse-gas" is provided. c. There are a number of cases where findings are referred to as "robust" but without italicisation. Unless italics are used, signifying that this is a defined and agreed use of the word, then the word robust needs to be followed by a description of what is meant. d. A word that has crept into the climate logical vocabulary relatively recently is "drivers". Historically used to describe physical factors that driver the climate system, such as solar radiation/energy, the word is now being used loosely described all sorts of influences on the systems and subsystems. To my way of thinking this suggests a lack of rigorous thought about how the word is used. e. The document explicitly refers to the States of Australia. The reviewer wonders whether for an assessment report that will be widely read globally, whether some indication of what and where these states are might be useful. (Graeme Pearman, Monash University)	Spelling and hyphenation was not considered a priority for the FOD but has been improved for the SOD. The use of words considered as 'jargon' by the reviewer has been reviewed and revised, but in some cases the authors consider those words to be the appropriate technical terms. The only phrases that have been italicised are those that correspond to the IPCC guidance on treatment of uncertainty and confidence. Other instances of the word 'robust' are intended to follow a more everyday meaning, but the use of such qualitative expressions has been considered and revised where necessary based on this comment. "Drivers" is widely used in ecology and agricultural science in just the way it is used in our text. Its use in other contexts has been checked and replaced by other wording as appropriate.
66	49285	25	1	0	94	0	CMIP5: I have to admit to have been surprised by the lack of use of 5AR models in considering the Australasian regional adaptation options. I can understand the timing of the production of the models, and their incorporation into the literature has probably made any significant incorporation difficult, and this may have been further exacerbated by the lack of opportunity to provide downscaled interpretations of climatic conditions related to adaptation options. It was still surprise to find out little this new modelling science and impacted this Chapter, and that in some cases reference was still being made to work based on CMIP3! a. Indeed, given the fact that adaptation options are likely to be related to two highly regional impacts, the document is surprisingly poor in its reference to the difficulties and challenges of providing regional projections. I presume this is covered elsewhere in the 5AR, but would expected some discussion of this relative to the Australasian region. b. In particular there could have been some specific mention of the regional climate research initiatives that exist in several locations across Australia and how they are working with stakeholders to provide a more rigorous basis upon which adaptation responses can be planned. c. A similar comment can be made about the use of SRES scenarios. (Graeme Pearman, Monash University)	The reviewer correctly notes the fact that literature on adaptation based on CMIP5 scenarios is still lacking, hence this could not be included in this chapter. CMIP5 model projections are provided where relevant. Generic issues about regional scale projections are covered by WGI and such a general discussion is outside the scope or space allowance of this regional WGII chapter. Our chapter does highlight the problems with regional projections of rainfall changes. Regional climate initiatives are now mentioned in the adaptation section. Relationship between SRES and RCP scenarios is discussed in chapter 1 and WGI.
67	49286	25	1	0	94	0	Negativity: For those of us who have been involved in climate-change research will some time, it is difficult to perceive of an assessment that does not raise an enormous range of potential threats; that is the nature of the problem. However there are two points to make here: a. In the first instance by the time one has consumed the 43 pages of text it is difficult not to feel overwhelmed by the negativity of the text. There are a few occasions where our potential for positive impacts and opportunities are mention. b. The reviewer is not suggesting that this be changed but rather indicating that to a large number of people within the community this will be regarded as doom saying and an excuse to disregarding the strong and appropriate messages that are being delivered. (Graeme Pearman, Monash University)	The point of the reviewer is well taken, even though no change is requested. The balance of positive and negative impacts reflects the balance of such findings in the literature and is consistent with the author's expert judgement. However, attempts have been made to provide a better focus on resilience as a positive principle that can help overcome or deal with negative impacts.
68	49287	25	1	0	94	0	Risk and resilience: To some extent the potential for the community respond in the way suggested in the previous point reflects the way worldviews are constructive and in particular the wiry risk is assessed. I would have preferred to have seemed a little bit more of an emphasis on the concept of resilience, hardly mentioned, and the fact that despite limitations to knowledge, potential risk has to be managed. This may be something that is taken up much more fully in other parts of the 5AR, but the very least reference to those issues could be made in this Chapter. (Graeme Pearman, Monash University)	We have adjusted the perspective in individual sectoral assessments to bring out more strongly current reslience, rather than current vulnerability. However, most of the climate change literature is focused on vulnerability and our assessment has to reflect the balance in the literature.
69	49288	25	1	0	94	0	Social and behavioural science: This chapter remains, as in previous assessment reports, primarily a physical science assessment. Some mention is made of the introduction of social and behavioural science, and perhaps the level is indicative of the late stages of this interface of climate-change issue with sociology and behavioural sciences. However the reviewer suggests that at least a little more could be made of these developments, and above all the absolutist necessity for physical scientists to become more engaged or only with economists but also a sociologist and behavioural scientists as we go forward. (Graeme Pearman, Monash University)	Treatment of social and behavioural science has been improved in the revised draft through addition of a dedicated new section 25.4.3. However, literature on the interaction between physical and social science findings is still very limited and more in the space of practice than the literature that forms the basis of the IPCC assessment. Revised 25.9 (now 2.11) includes a better mention of the need to link social and physcial science approaches, and that this requires a two-way interaction.
70	49289	25	1	0	94	0	Rainfall and hydrology: There seems to be a disproportionate emphasis of rainfall changes and not enough on the connections to hydrology, hydrologic modelling, soil moisture and stream flow. (Graeme Pearman, Monash University)	We do talk about this link (in section 25.5.1) and provide cross-references to 25.2. Within space constraints we did not feel able to devote more space to this.
71	37510	25	1	1	45	3	General Comment 1: This chapter is in really good shape, and congratulations to the authors for a superb effort. My comments have been mostly minor ones, and aimed at fine-tuning what is already a very good chapter. I think the balance is excellent, and there is very little to be done to improve it. Don't be tempted to wander too far away from the structure that you already have. (Will Steffen, The Australian National University)	Noted, thank you.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
72	37511	25	1	1	45	3	General Comment 2: There is a strong disconnect between climate scenario-driven impacts studies and the research on the socio-economic determinants of vulnerability and on adaptation approaches. This most likely simply reflects the fact that these research communities still work in isolation and there is not much integration among them. This disconnect is mentioned, but only very briefly and only once - on p. 42, lines 46-48. Perhaps it could be mentioned in a few appropriate places earlier in the chapter. It does raise the question: Are scenario-driven impact studies more useful in informing the level of mitigation required to avoid "dangerous" climate change than they are for developing adaptation approaches? (Will Steffen, The Australian National University)	Partially accepted; the disconnect is also mentioned at the end of 25.4 (now 25.3), where this is a key conclusion of that section. However, there is emerging evidence of greater integration at the local scale, which is reflected in 25.4, including by its reference to a decision-centric (rather than impacts-centric) approach developed for and promoted by local government. The final question of the reviewer is a good one but not one that the authors feel can be answered explicitly by this assessment.
73	37512	25	1	1	45	3	General Comment 3: I found the back-end of the chapter - starting with the Interactions section on p. 38 and onwards really useful. I think it is getting at some the issues that, in reality, decisionmakers face when they develop adaptation strategies. If there is any rebalancing to be done, these topics could be expanded a little and the more traditional scenario-driven impact studies at the beginning of the chapter could be given a little less weight. (Will Steffen, The Australian National University)	Noted, thank you, and taken into consideration as guiding principle when responding to review comments and preparing the second order draft. In particular the climate science section has been greatly condensed, and the synthesis section expanded.
74	37513	25	1	1	45	4	General Comment 4: Perhaps the only real surprise in the chapter was the general lack of material on a resilience framework for climate adaptation. Given the large uncertainties around somo of the climate projections - especially rainfall in Australia, a particularly effective approach to deal with such uncertainties is to focus on building resilience in general rather than trying to adapt to a specific climatic change that is highly uncertain. Is the problem a lack of research on climate adapation using a resilience approach, or was resilience-oriented research deemed to be outside the scope of the chapter? (Will Steffen, The Australian National University)	Resilience is not outside the scope of our chapter, it's just not clear how to adopt such an approach and yet do justice to the predominantly vulnerability focused literature on which this assessment has to be based. Discussing a resilience concept generally without place-specific climate change related studies from Australasia was considered outside the scope of the chapter in light of space constraints.
75	41250	25	1	94	0	0	I would like to begin by congratulating the writing team for an excellent effort. Chapter 25 provides a thorough update of climate change projections, impacts, mitigation, risk & vulnerability and adaptation for the Australasia region across key ecosystems and economic sectors. The review demonstrates that Australia and NZ are world leaders in the field of climate change science, impacts and adaptation. (Stephen Turton, James Cook University)	Noted, thank you.
76	41254	25	1	94	0	0	The following publication contains material of interest to the Lead Authors of Chapter 25: Laurance, William F., Dell, Bernard, Turton, Stephen M., Lawes, Michael J., Hutley, Lindsay B., McCallum, Hamish, Dale, Patricia, Bird, Michael, Hardy, Giles, Prideaux, Gavin, Gawne, Ben, McMahon, Clive R., Yu, Richard, Hero, Jean-Marc, Schwarzkopf, Lin, Krockenberger, Andrew, Setterfield, Samantha A., Douglas, Michael, Silvester, Ewen, Mahony, Michael, Vella, Karen, Saikia, Udoy, Wahren, Carl-Henrik, Xu, Zhihong, Smith, Bradley, and Cocklin, Chris (2011) The 10 Australian ecosystems most vulnerable to tipping points. Biological Conservation, 144 (5). pp. 1472-1480. ISSN 1873-2917 (Stephen Turton, James Cook University)	Noted, thank you, this reference has been used in the revised text.
77	45117	25	2	48	0	0	I note and applaud the minimal use of the word 'uncertainty' in the Executive Summary; it would be great to keep this to levels of confidence and ranges of possible change as much as possible, given the misleading interpretations placed on 'uncertainty' (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Noted, thank you, and taken into consideration as guiding principle when responding to review comments and preparing the second order draft.
78	51513	25	2	48	0	0	Executive Summary -- The format, stylistic approach, and level of detail adopted in the executive summary are superb. (Katharine Mach, IPCC WGII TSU)	Thank you
79	51514	25	2	50	2	50	The extent of the "region" is clearly established in the 1st sentence of the introduction, although not in the 1st paragraph of the executive summary. It would be preferable to at least specify the extent of the region (Australasia) in most general terms on this line. (Katharine Mach, IPCC WGII TSU)	Rejected, we feel this is unnecessary detail for the executive summary and has not been done in previous assessment reports either.
80	49828	25	2	50	2	54	The evidence for temperature increases is dubious (see Gray, V R "The Seven Station Series 2011 Energy and Environment Vol 22 pages 429-439.) Sea Level is not rising in the South Pacific (see Gray V R http://scienceandpublicpolicy.org/south_pacific.html. (Vincent Gray, Climate Consultant)	The cited paper does not make adjustments to temperature records associated with station changes, and hence presents a flawed analysis of historic temperature for New Zealand. The NIWA seven station series analysis (with homogeneity adjustments) shows warming of 0.9°C / century for NZ, as quoted (see Table 25-1, Row 1).
81	46521	25	2	51	0	0	For clarity, The regional climate of Australasia is changing … (Neville Smith, Bureau of Meteorology)	Rejected, the regional context should be clear from the title and focus of this chapter. We're trying to keep the executive summary as brief as possible.
82	46522	25	2	53	2	54	'some parts' lacks precision (2%? 10%) and so makes the 'medium confidence' weak (Neville Smith, Bureau of Meteorology)	We now specify the region as far south-west Australia, consistent with the underlying revised text.
83	46523	25	3	4	0	0	Need to check evidence for including flood risk (guess it is projections) (Neville Smith, Bureau of Meteorology)	Updated confidence rating for extreme rainfall and flood risk, based on revised underlying text, as medium confidence.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
84	41128	25	3	4	3	4	"…increasing extreme rainfall and flood risk in many location…" I would say this portion of the statement is low confidence; I am not convinced by the evidence of a net increase in extreme rainfall and flood risk everywhere in Australia as it will depend on a diversity of factors. I am not aware of compelling evidence that flood risk will increase in much of Australia. I will elaborate on this statement in my comments for the relevant sections in the body of the report. (Seth Westra, University of Adelaide)	The medium confidence rating has been maintained. The statement and its confidence rating is based the material on extreme rainfall now included in table 25.1 in Section 25.2 and on the material on flood occurrence included in Box 25.8. The new Table 25.1 gives 'low confidence' for changes to annual daily extremes (this is consistent with SREX and WGI, and recognises issues raised by some reviewers), but 'medium confidence' for increases in sub daily extremes and 1-20 year daily extremes, which we believe is justfied by recent evidence (see comment 182 response below). Noting that sub-daily and rare rainfall extremes are more relevant for flood occurrence, and combining this with the evidence for increased flood risk presented in Box 25.8, we conclude that 'medium confidence' on this statement for 'many locations' is justified.
85	41509	25	3	6	0	0	(Missing material that might fit here): Research is underway in NZ on the vulnerability of various marine species (not just deepwater corals) to pH change. I suggest you contact Vonda Cummings (NIWA Wellington) for references on this. (David Wratt, NIWA, New Zealand)	Research is indeed underway but findings from this research are not clear enough yet to warrant their inclusion in the executive summary.
86	41490	25	3	8	0	0	I suggest replacing "fire weather" with "the frequency of conditions conducive to forest fires" since this is an Executive Summary and some readers might not be familiar with the term. (David Wratt, NIWA, New Zealand)	Rejected, "fire weather" is a widely used and well-defined technical term. This has now also been included in the WGII glossary.
87	49290	25	3	8	0	0	Why south–eastern and not also south western? (Graeme Pearman, Monash University)	Changed to "most of southern Australia"; south-eastern Australia has been better studied but we agree with the reviewer that the risk applies to most of southern Australia based on the principles responsible for fire weather.
88	42488	25	3	9	3	10	No mention of sea level rise projections (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	A relevant sentence on sea level rise has now been included, based almost entirely on the WGI assessment.
89	41126	25	3	11	3	12	"Uncertainty in projected rainfall changes remains large for many parts of Austraila and New Zealand, which creates significant challenges for adaptation (high confidence)." I am not convinced by the premise of this statement. Considering results from both the CMIP3 and CMIP5 experiments, there is significant disagreement throughout most of Australia (except some of the more southerly latitudes and possibly also the northern portion of the country) about the direction of change in rainfall. The results therefore can be interpreted as either: (1) a high level of disagreement between models and therefore a high level of uncertainty, creating challenges for adaptation; or (2) a central tendency of little change in rainfall, with a scatter about that central tendency exhibited by the models, leading to less of a concern for adaptation. I do not feel that the authors have been successful in making the case for the first of these interpretations of the modelling results, and some discussion of this is necessary. (Seth Westra, University of Adelaide)	We do not feel the comment is justified. There is high confidence (from agreement between rainfall projections and hydrological modelling informed by these projections) of decline in rainfall and freshwater resources in far south-west and far south-east (0-40%). This is a very large range with significantly different adaptation requirements. This is made clear in the underlying sections (25.2, and 25.5.1, Box 25-2), and appears obvious here. No change made. We note also that the reviewer's interpretation (1) (which is also that of the authors), is supported by the results of Irving et al. (in press) (cited in the revised chapter), as well as being more consistent with the risk management perspective on WGII.
90	43708	25	3	11	3	12	This could be clarified. Uncertainty in the projections tends to delay planning of responses and so can lead to an increase in impacts. Is that the "challenge for adaptation"? Or is it that there becomes more chance of investing in forms of adaptation that are not necessary, reducing the resources for adaptation that is more necessary? (Martin Manning, Victoria University of Wellington)	This applies to both aspects. Strong uncertainty about the future can result in maladaptation, delays in adaptation, and signficant disagreements about the nature and choice of adaptation types. All these are implicit in the existing wording, whereas a revision would make it more specific than is intended or justified. No change made.
91	42489	25	3	11	3	16	Uncertainty in the magnitude of change is large for many variables, but here it seems you are specifically referring to the uncertainty in the direction of change, rather than the magnitude of change. If so, this is indeed what separates rainfall from most other variables, so consider changing "projected rainfall changes" to "projected direction of rainfall changes". (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	It is correct that rainfall direction change is uncertain for some regions, but the example we give here for resulting runoff ranges from little change to significant drying, hence focusing only on the direction of change would be inappropriate here. The existing wording is more general and hence more appropriate.
92	46524	25	3	12	0	0	High confidence that something is uncertain seems an odd construct to me. The object of the assessment is projected rainfall and while there are multiple lines of evidence, there is lack of agreement across the model. The Guidance suggests it should have 'low confidence' attached, but that is the analogous to saying "Uncertainty … remains large". (Neville Smith, Bureau of Meteorology)	Confidence statement deleted. We note though that high confidence in something being uncertain can be meaningful, e.g. where there might be a public perception of greater certainty than science does in fact provide. We will reconsider this for the final draft.
93	48948	25	3	12	0	14	The example used provides one very specific case - is it possible to be more generalized or provide several examples? (Chris Cameron, Wellington City Council)	This is an indeed only an illustration, albeit an important one. Giving a full list of the range of rainfall changes in all sub-regions would not be appropriate for the Executive Summary. Added "For example" to make clear that this is only one example.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
94	41127	25	3	12	3	13	"Projections for average annual runoff in southeastern Australia range from little change to a 40% decline for a 2 degree C global warming." The connection between this sentence and the previous sentence is unclear. Given the large uncertainty in rainfall about a central tendency of limited change across most of Australia, it is clear that the higher confidence that runoff will decline is likely to be due to the increased potential evapotranspiration which is caused by the increase in atmospheric temperature. Thus, a connecting sentence is needed explaining why it is possible to be both uncertain about the direction of change in rainfall but comparatively more confident about the direction of change in runoff. (Seth Westra, University of Adelaide)	The statements for rainfall and for runoff are consistent. There is large uncertainty in the rainfall projections, but the central tendency is not zero change for south-eastern Australia. The rainfall changes projected across different models are then amplified in the runoff projections - hence the large range in the runoff projections (in this particular case, anything from zero to 40%). This is explained in detail in the underlying text (Section 25.5.1), providing this detail here would not be appropriate for an Executive Summary.
95	41491	25	3	14	3	16	The use of "crucial" in this sentence sounds rather poliy-prescriptive. Perhaps reword this sentence as something like: "Given this uncertainty, adaptive management practices will provide a much more robust methodology than management based only on projected central estimates". (David Wratt, NIWA, New Zealand)	Sentence has been shortened to simply point out the significant needs for transformative adaptation under the dry end of scenarios.
96	41492	25	3	17	0	0	I suggest addition of a sentence about observations and projections of ocean pH change in the region at this position in the Executive Summary. (This will require more assessment of this topic in the body of the report). (David Wratt, NIWA, New Zealand)	Stating trends in ocean pH would simply repeat WGI information and doesn't seem justified in the executive summary of this chapter. We have no observations of impacts of changing ocean pH in the region to justify their inclusion in the executive summary. Relevance of changes in CO2 and ocean pH has been included though in a later statement as causes of projected future impacts.
97	42490	25	3	18	3	27	Since this paragraph refers to observed impacts, it seems more logical to place it immediately after the first paragraph in the Executive Summary (The regional climate is changing) and before the paragraph "Regional warming is projected to continue… associated with other changes in climate". If this makes sense, you'd need to remove the text "and frequency and/or intensity of such events is projected to increase in many locations" since this is covered in the projections paragraph. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We considered this and discussed extensively. However, since the paragraph includes a statement about projected future changes, we feel it has to come after the paragraph about projected climate changes. The reference to future changes is necessary to indicate that we selected only those extremes that are actually expected to change with climate change, not any extreme event that happened recently.
98	38648	25	3	20	3	21	References/evidence to support statement that "high sea surface temperatures have REPEATEDLY bleached coral reefs in north-eastern Australia" - mass coral bleaching on the Great Barrier Reef was observed in 1998, 2002 and in the southern GBR in 2006 - so more accurately would be "mass coral bleaching events (due to high thermal stress) has been observed three times in recent decades" (Janice Lough, Australian Institute of Marine Science)	Estimates of the number of times bleaching events have occurred varies amongst different authors. However, even just three times is quite accurately represented by the word "repeatedly" so no change has been made
99	49291	25	3	23	0	0	Why not include the number of deaths resulting from heat stress? (Graeme Pearman, Monash University)	Excess deaths from the heat wave are now stated.
100	42491	25	3	23	3	23	If you mention 35 deaths due to floods, you should certainly include 374 excess deaths due to the 2009 heatwave. Consider including the economic costs, i.e. $4b loss due to fires in 2009, over $2b loss due to Queensland floods in 2011, $7.4b for drought in 2002-03, etc. Might be worth including a cyclone example given the emphasis placed on a potential increase in cyclone intensity (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Excess heat-related deaths are now stated. We included economic cost of drought as example, but not other costs since the paragraph simply becomes too unwieldy to serve its purpose for the executive summary.
101	43709	25	3	25	0	0	Should rephrase this a bit so that it does not sound like drought in NZ contributed to mental health problems in Australia (Martin Manning, Victoria University of Wellington)	Wording has been revised to reduce the risk of such a misunderstanding, although we feel that this type of misunderstanding is rather unlikely.
102	42492	25	3	25	3	25	The drought in south-east Australia occurred from 1997-2009 (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Accepted, dates have been revised.
103	37489	25	3	29	3	31	I wouldn't put "very high confidence" on the projection of declining freshwater resources in SE Australia. I guess this depends somewhat on what you define as SE Australia, but, for example, for Sydney's water supplies I don't think a consideration of the full range of model projections warrents a "very high confidence" level (Will Steffen, The Australian National University)	Accepted: revised confidence level to 'high' and specified more clearly 'far south-west and far south-east'.
104	48949	25	3	32	0	0	Is 'increasing frequency of heavy rainfall events' confirmed? Or is it just greater rainfall intensity? (Chris Cameron, Wellington City Council)	By definition, an increase in intensity would equate to an increase in frequency of a rainfall event with a given high intensity. We have shortened the wording to more generally refer to "heavy rainfall" without trying to focus on either the frequency or intensity aspect of heavy rainfall, as the two are inter-linked.
105	35530	25	3	38	3	42	Chapter states - “Some sectors in some locations have the potential to benefit from projected changes in climate and/or to capitalize on proactive adaptation measures”: My fear is that such language falls into a “winners and losers” discourse that has become pervasive in the climate change literature which is informed by a neoclassical microeconomic perspective. Remotely located Tasmania and New Zealand are sometimes mentioned as winners. Other winners that are cited include Canada, the Arctic, Greenland, and Russia. Such scenarios sometimes are used as justifications for oil and petroleum exploration which in turn will contribute to more global climate change. The ‘winners and losers’ discourse appears again on page 43, lines 49-52. (Hans Baer, University of Melbourne)	Rejected; we do not refer to 'winners and losers' here or later in the chapter. NOT referring to beneficial impacts, where they have been clearly documented in the literature, would constitute a failure to provide a comprehensive and unbiased assessment. How the fact that some sectors and regions might benefit from climate change is constructed socially to respond to climate change at a global level is outside the control of the authors of this chapter.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
106	48950	25	3	39	0	0	Can an example of capitalizing on proactive adaptation measures be provided? (Chris Cameron, Wellington City Council)	After further consideration, we decided to remove reference to capitalising on proactive adaptation measures entirely, since it is not sufficiently clear whether this is really capitalising on an opportunity or simply a planned adaptation measure.
107	42493	25	3	41	3	41	Forest growth is also likely to increase where nutrients and water are not limited (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Noted and text modified accordingly
108	49292	25	3	46	0	0	“reducing energy”. This is close to mitigations and it raises the question, where is the line drawn between mitigation and adaptation? (Graeme Pearman, Monash University)	The scope of the chapter includes direct synergies and trade-offs between adapation and mitigation, and hence reference to this issue in this particular context is consistent with this mandate because the change in energy demand is a direct impact of climate change.
109	41221	25	3	48	3	49	Recent changes in coastal planning policy in Victoria and the current review of Planning Act in NSW indicate a relaxation in policy responses to sea lavel rise; this trend is being reinforced by legal decisions and local government practice - reference latest report for the Seachange Taskforce; citation: Gurran, N, Norman, B, Gilbert, H, Hamin, E, 2011, Planning for climate change adaptation in Coastal Australia: State of Practice, Report 4 for the National Seachnage Taskforce, University of Sydney, November, Sydney, Australia (Barbara Norman, University of Canberra)	Inserted "subject to political changes", with a fuller discusson of changes in planning provisions in the underlying text. However, we do not think there is sufficient evidence to detect any consistent or long-term trend towards relaxing policy responses to SLR.
110	49293	25	4	8	0	0	“industries”? (Graeme Pearman, Monash University)	Yes, word modified.
111	49294	25	4	13	0	0	Why “regional key risks” in commas? (Graeme Pearman, Monash University)	The placement in inverted commas was intended to flag that the phrase 'key risk' has actually been defined by chapter 19, it is not just an everyday use of those words. Changed to italics.
112	43115	25	4	13	5	2	Although I found the key statements in the Executive Summary up to this point pretty bland and boring, I did find the eight regional key risks interesting. They do seem to cover off on most of the key issues. I'd suggest these become more important in the Executive Summary and that the bold headline statements are shortened and/or made fewer and/or if possible, made a little more engaging. (Jean Palutikof, Griffith University)	We do not feel that, for an executive summary, the space given to those key risks can justifiably be expanded further, and the number of key risks reflects the expert judgement of the authors that should not be changed simply to make them more engaging. However, we did attempt to revise wording throughout to make the key points as engaging as possible.
113	43710	25	4	13	5	2	This summary of eight regional key risks should also indicate the time scales which can be quite different for increased morbidity due to heat waves and sea level rise of more than 1 m. (Martin Manning, Victoria University of Wellington)	The chapter now includes a statement that the key risks refer to potential impacts during the 21st century and not over an unspecified longer term.
114	53572	25	4	13	5	2	This is quite interesting. There also are possible impacts where climate is one of multiple drivers and interactions are too complex to determine whether future impacts could be attributed to climate change. (Kristie L. Ebi, IPCC WGII TSU)	Noted, but in our judgement such impacts would not qualify as key risks from climate change. They might be key risks to the region in a bigger sense, but it would not appear appropriate to highlight those as key risks in a chapter that is intended to focus on climate change impacts and adaptation.
115	38649	25	4	19	4	21	I think "significant change in community structure of coral reefs" rather than "collapse" would be more accurate. See, for example, Fabricius et al (2011, in reference list) regarding impacts of ocean acidification on coral reef diversity and community makeup. (Janice Lough, Australian Institute of Marine Science)	Noted, thank you. Reworded as suggested.
116	37490	25	4	27	4	31	Is this consistent with SREX (2012), in which there was low confidence in the projections of a (modest) increase in extreme rainfall events in southern Australia and NZ? (Will Steffen, The Australian National University)	The statement here is about risk, not about likelihood of a projected change occurring. Given the very large economic damages from flooding, we feel that flood risk warrants inclusion here even if we had only low confidence in an increase in flood risk (being then a low-probability/high-impact event). However, we do maintain that we have medum confidence in increasing flood risk. See response to comment #84.
117	49295	25	4	30	0	0	“integrated planning responses are well understood” Unclear, suggest reword. (Graeme Pearman, Monash University)	Removed, we feel the description of the flood risk and limitations to an incremental adaptation approach stands on its own.
118	41222	25	4	30	4	30	integrated planning responses are well understood'- - if you are confident about this statement then you need to support it ; I am not confident about this statement as understanding at different levels of government level is variable - an alternative phrase could be - more integrated planning approaches are leading practice (Barbara Norman, University of Canberra)	Accepted, on reflection we feel the description of the flood risk and limitations to an incremental adaptation approach stands on its own.
119	49296	25	4	36	0	0	“driven”, impacted by, influenced by? (Graeme Pearman, Monash University)	Replaced by "resulting from".
120	42494	25	4	41	4	41	Design standards and building codes can also assist with adaptation (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Accepted and included.
121	49297	25	4	44	0	0	“even under”? All scenarios? (Graeme Pearman, Monash University)	Added the word "entirely" - and with this addition we feel this is justified for all scenarios (at least down to RCP2.6).

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
122	49298	25	4	46	0	50	There is a danger that this will imply that all exposure is related to mean sea-level rise, rather than also event driven. If this is the case it is unfortunate because amongst coastal management practitioners this is too often the simplification that exists and this report should make the impacts of extreme events due to the simultaneous occurrences of low atmospheric pressure, wind direction, mean tide, geomorphology and sea level. (Graeme Pearman, Monash University)	It is still the underlying rise in mean sea level that drives the damage associated with an extreme event, and in some cases (e.g. Salination of water supplies and estuaries, rising water tables affecting foundations) the damage is not related primarily to extreme events. So on balance, we feel the wording is appropriate since a greater focus on extremes would seem to discount these other impacts, and for an executive summary, we cannot list all contributing factors in detail.
123	43711	25	4	47	0	0	This should be rephrased to remove the word "if" in the first sentence because the paleoclimatic data indicate a very high probability that even for a global warming of 2°C the long term effects will involve SLR of more than 1 meter. Alternatively make it clear that this is only considering effects to 2100. (Martin Manning, Victoria University of Wellington)	The intent is to focus on impacts up to 2100. Re-worded chapeau to make clear this focuses on 21st century risks. Statement about risks beyond 2100 has been shifted to end of para to avoid this confusion.
124	48951	25	4	47	0	0	Why underlining of "if"? Isn't this amount of sea level rise already 'in the system' (with high confidence)? (Chris Cameron, Wellington City Council)	The intent is to focus on impacts up to 2100, and in that case it is not at all a given that sea level will rise by 1 m (thankfully). Re-worded chapeau to make clear this focuses on 21st century risks. Statement about risks beyond 2100 has been shifted to end of para to avoid this confusion.
125	45118	25	4	49	0	0	Suggest use of 'fast' rather than 'high' rate of change (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Accepted (with deletion of "rate of").
126	49299	25	4	52	0	0	“were” or “are”? and Line 53, “agricultural”? (Graeme Pearman, Monash University)	Accepted.
127	42495	25	5	7	5	8	Availability of land is one of many constraints, so it's unclear why this is highlighted. Rather than listing more constraints, consider deleting "where availability of suitable land acts as a constraint". (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Accepted, also because there are very few instances where availability of suitable land doesn't act as constraint.
128	48952	25	5	13	0	0	Is there really sufficient evidence to support that Australia is more vulnerable? For example, sea level rise impacts are dependant on tidal range and storm affects - has assessment being done for all Australasian coastlines? (Chris Cameron, Wellington City Council)	The assessment was based on a comparison of all effects; vulnerability to SLR is one of the few instances where vulnerability might be similar between Australia and NZ. However, based on this and other comments, the entire paragraph has been removed.
129	42496	25	5	19	5	22	The list of factors such as … obviously isn't meant to be comprehensive, but the examples given might not be the best. Your chapter lists many other factors that affect vulnerability, so it may be worth reviewing these again to assess whether you're presenting the best examples in the Executive Summary. I was surprised not to see factors such as education, politics, investment priorities and access to insurance. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	These points are indeed relevant, but there is less evidence that these are materially different between the two countries. The intent of this para was to consider whether Australia and NZ have different levels of nationally aggregate vulnerabilities, hence the focus in this list is on those factors where the countries differ most. However, based on this and other comments, the entire paragraph has been removed.
130	49300	25	5	32	0	0	“Both have..” would be better? (Graeme Pearman, Monash University)	Accepted, modified accordingly.
131	43712	25	5	34	5	38	In the interests of shortening the current text, I think that this paragraph can be removed as the chapter's table of contents is very clear. (Martin Manning, Victoria University of Wellington)	Accepted, thank you, paragaraph has been removed
132	49301	25	5	43	0	0	Remove extra periods and colon. (Graeme Pearman, Monash University)	Accepted, done.
133	46525	25	5	45	0	0	Though the ES of Hennessy et al states that a rise of 70 mm in sea level has occurred since 1950, this number cannot be found in Section 11.2.1 and so it is unclear how it was derived (the NZ and Australia numbers are also over slightly different periods, and none referenced to 1950) or the level of uncertainty. Suggest either quoting the numbers in 11.2.1 or omitting altogether. (Neville Smith, Bureau of Meteorology)	The number of 70mm can be inferred robustly from the decadal rates stated in the AR4 chapter. Wording revised to make clear that this is an approximate number averaged across the region, since decadal rates given in the AR4 differ among locations.
134	49302	25	5	45	0	0	First of the incorrect use of units. Should read, “70 mm”. (Graeme Pearman, Monash University)	Corrected.
135	41523	25	6	9	0	0	Not clear whether authors are talking about terrestrial biodiversity in the NZ sub-antarctic islands or marine biodiversity in the intertidal, sub tidal and so on. (Mary Livingston, Ministry for Primary Industries)	This comment is based on the Execitive Summary of AR4. The point being made is a general one about biodiversity sensitivity and applies to both terrestrial and marine species asociated with the islands. No change has been made. For detail readers can consult the AR4 documents in full.
136	41524	25	6	13	0	0	Not clear whether authors are talking about terrestrial biodiversity in the coastal region or marine biodiversity in the intertidal, sub tidal and so on. (Mary Livingston, Ministry for Primary Industries)	This comment is based on the Execitive Summary of AR4. The point being made is a general one about biodiversity sensitivity and applies to both terrestrial and marine species asociated with the islands. No change has been made. For detail readers can consult the AR4 documents in full.
137	53573	25	6	17	0	0	Please ensure consistency with WGI. (Kristie L. Ebi, IPCC WGII TSU)	Text has been cross-checked with WGI.
138	42497	25	6	22	6	22	Some readers may be unfamiliar with the SRES scenarios. Provide a cross reference to more detailed information, or briefly describe them here. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Suggestion incorporated by including cross references to WGII chapter 21 and WGI chapter 14.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
139	43116	25	6	25	10	54	This is a huge section on climate change that will be a real turn-off for people coming to the chapter to read about impacts and adaptation. This really needs to be condensed down, and maybe most of the information could usefully be put in a table. (Jean Palutikof, Griffith University)	Suggestion incorporated by including Table 25-1 and substantially reducing the text in Section 25.3 (now 25.2).
140	42498	25	6	27	6	27	be more specific about "the past 100 years", e.g. 1910-2011. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This text has been removed with the information now represented in Row 1 of Table 25-1. The specific starting dates for the temperature trends in Australia and New Zealand are now stated in the table entry.
141	49829	25	6	27	6	27	Vincent GrayThe Seven Station Series 2011 Energy and Environment Vol 22 page s 429-439.) shows that New Zealand tmperatueres are not significantly increasing (Vincent Gray, Climate Consultant)	The cited paper does not make adjustments to temperature records associated with station changes, and hence presents a flawed analysis of historic temperature for New Zealand. The NIWA seven station series analysis (with homogeneity adjustments) shows warming of 0.9°C / century for NZ, as quoted (see Table 25-1, Row 1).
142	43713	25	6	27	6	33	There does not seem to be any reason for citing the change in land temperatures over 100 years and in ocean temperatures as the average per decade. Why not use the same language in each case. (Martin Manning, Victoria University of Wellington)	Suggestion incorporated by using temperature change per decade for both land and sea surface changes (see Table 25-1, Rows 1 and 2).
143	41493	25	6	28	0	0	I suggest you add an uncertainty range to the temperature trends reported here. An unqualified number to two places of decimals gives a false idea of preceision. For example Mullan et al 2010 give a 95% confidence interval of ± 0.29°C/Century on the NZ number. So perhaps quote 0.9± 0.3 °C per century for NZ ? (David Wratt, NIWA, New Zealand)	Suggestion incorporated by including uncertainty values in Table 25-1 Row 1.
144	41494	25	6	31	0	0	Given no uncertainty range is provided here for the NZ sea surface temperature change, I suggest replacing "by 0.07°C per decade" with "by about 0.07°C per decade" (David Wratt, NIWA, New Zealand)	Suggestion incorporated in Table 25-1 Row 2.
145	51515	25	6	32	6	32	As a minor point, it would be clearest to specify the timeframe for the described temperature increase at the end of this list--also since 1950? (Katharine Mach, IPCC WGII TSU)	Suggestion incorporated in Table 25-1 Row 2.
146	49303	25	6	36	0	0	First use of unhyphenated “greenhouse-gas”. (Graeme Pearman, Monash University)	This text has been removed. There is now a reference to "anthropogenic climate change" in Row 1 of Table 25-1.
147	49304	25	6	41	0	47	This is the first example of where a tabulation of the temperature responses as a function of scenario with references attached might be a better way of presenting the data. As it is the sentences are hard to read. (Graeme Pearman, Monash University)	The information is now presented in Table 25-1, Row 1. Note, only examples of projected changes have been included, as a space-saving measure.
148	41495	25	6	41	6	51	I suggest it would be helpful to your readers if you clarify in this paragraph whether the various scenarios you discuss are only scenarios with no policy-driven reductions in GHG emissions (ie SRES-type scenarios), or include "stabilization scenarios' with policy-driven emissions reductions. Your readers might not be familiar with what CMIP3 and CMIP5 scenarios cover. (David Wratt, NIWA, New Zealand)	The text has been substantially reduced as a space-saving measure. However, we now include cross references to WGII chapter 21 and WGI chapter 14 where readers can read about models and scenarios. See section 25.2.
149	46526	25	6	46	6	47	Provide Reference for B1 and A1FI results. (Neville Smith, Bureau of Meteorology)	This information is now in Table 25-1, Row 1, and is cited from MfE (2008).
150	46527	25	6	49	0	0	… annual average SURFACE temperatures (Neville Smith, Bureau of Meteorology)	Suggestion incorporated in Section 25.2.
151	46528	25	6	50	6	51	Delete “, including modelled past temperatures if there had been no anthropogenic influence on the climate system but only natural drivers of variability and change. “ – the caption contains a clearer explanation. (Neville Smith, Bureau of Meteorology)	Accepted, text deleted as this detail is contained in the figure caption.
152	43714	25	6	51	0	0	When considering the effects of climate change and comparing different regions it can be deceptive to simply compare the absolute amounts of change as is done here. The information is important, but it is also very relevant to compare amounts of change to the ranges that systems have become adapted to. E.g. [Dillon, M.E., Wang, G., and Huey, R.B., 2010: Global metabolic impacts of recent climate warming. Nature, 467, 704-706.] shows why the nonlinear effects of temperature on metabolism mean that regions with less warming are already seeing larger impacts because they are being pushed outside the range that they have become adapted to. So I think that this should be mentioned as well as the quantitative summary of changes so far. (Martin Manning, Victoria University of Wellington)	Misplaced as this section is about physical climate change, not impacts. Considered for inclusion in 25.6.1 (terrestrial ecosystems), but rejected due to lack of studies specific to the region. The cited study shows inconslusive results for Australia and thus does not support the assertion, and we have not found other publications that do.
153	49305	25	6	51	0	0	Remove ““drivers of”. (Graeme Pearman, Monash University)	Suggestion incorporated in revised Section 25.2. "drivers" replaced with "modes".
154	46529	25	7	2	2	17	Caption should say annual average surface temperatures. “Observed values” do not suffer, but errors in observed annual average temperatures can be larger for some early data sparse periods. (Neville Smith, Bureau of Meteorology)	Suggestion incorporated in revised Section 25.2 in caption of Fig 25.1.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
155	41129	25	7	4	7	4	"In eastern and northern Australia, the direction of future change remains uncertain (very high confidence)." As per my comment in the executive summary, I feel that the authors have a choice between emphasising: (1) the uncertainty; or (2) the central tendency; and this phrasing indicates that they have decided on the former. The results in Figure 25.2 could equally be interpreted as stating that the ensemble average of the models are that there will be limited change in annual average precipitation in most of Australia, except for the southern parts (particularly southwest Western Australia) and possibly the northern parts. The reason why the authors focus on the uncertainty rather than the central tendency needs substantiation, as the policy implications of this emphasis are significant. (Seth Westra, University of Adelaide)	We do not see the basis for the comment. there is high confidence (from agreement between rainfall projections and hydrological modelling informed by these projections) of decline in rainfall and freshwater resources in far south-west and far south-east (0-40%). This is a very large range with significantly different adaptation requirements. This is made clear in the underlying sections (25.2, and 25.5.1, Box 25-2), and appears obvious here. No change made. We note also that the reviewers interpretation (1) (which is also that of the authors), is supported by the results of Irving et al. (in press) (cited in the revised chapter), as well as being more consistent with the risk management perspective on WGII
156	42499	25	7	8	7	9	"external drivers" is jargon. Many readers won't understand this so provide an explanation or give a cross reference to more detailed information (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We are using a standardised caption for the revised figure, with additional information provided in chapter 21 (cross-referenced).
157	49306	25	7	9	0	10	Excessive use of the term “drivers”. Why not “external factors that influence climate. All readers will understand that. “simulations driven” is jargon. Suggest reword in common English. (Graeme Pearman, Monash University)	We are using a standardised caption for the revised figure, with additional information provided in chapter 21 (cross-referenced).
158	38650	25	7	20	7	33	This section on temperature extremes needs to make clear that it is referring to temperatures over land and daily extremes. It would be useful to include some information about sea temperature extremes around Australia - see, for example, Lima FP & DS Wethey 2012. Three decades of high-resolution coastal sea surface temperatures reveal more than warming. Nature Communications. 3:704 doi: 10.1038/ncomms1713. (Janice Lough, Australian Institute of Marine Science)	The information is now presented in Table 25-1, Row 3. Note, only past changes and future projections of air temperature extremes have been included, as a space-saving measure.
159	42500	25	7	33	7	33	is 25C extreme? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The information on rainfall change is now presented in Table 25-1, Row 4.
160	42501	25	7	38	7	38	autumn/winter rainfall HAS declined ... (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The information on rainfall change is now presented in Table 25-1, Row 4 and no longer includes reference to these record years.
161	41496	25	7	39	0	0	I suggest you state the period out of which which the 2011 - 2010 dry conditions comprise a "record" (e.g. "... a record over the period for which extensive rainfall records are available, ie 19xx - to 20xx"). My reasoning here is that maybe they are not a record if you take paleoclimate scales into consideration?. (David Wratt, NIWA, New Zealand)	The information on rainfall change is now presented in Table 25-1, Row 4 and no longer includes reference to these record years.
162	38652	25	7	39	7	40	See comments Page 35 lines 51-53; Reference to results of Potter et al (2010) need to be clear what parts of "inland eastern Australia" are being referred to and the period covered for 2001 to 2010 experiencing "record dry conditions". (Janice Lough, Australian Institute of Marine Science)	The information on rainfall change is now presented in Table 25-1, Row 4 and no longer includes references to these record years. Spelling and typographical issues will be addressed at the copy editing stage.
163	49307	25	7	46	0	0	First use of the US spelling of “modelling”! (Graeme Pearman, Monash University)	The information on rainfall change is now presented in Table 25-1, Row 4. The text no longer includes detailed discussion on causes of past rainfall changes due to space restrictions.
164	46530	25	7	47	0	0	“poorly understood reasons” would suggest we have no idea. Frederiksen and Frederiksen (2011), Cai et al 2011 and Rotstayn (2012) provide possible mechanisms. Suggest NW Australia … (Jones et 2009) but the mechanisms are not yet fully understood (Frederiksen and Frederiksen 2011; Cai et al 2011; and Rotstayn 2012) ([Frederiksen, J.S. and C.S. Frederiksen, 2011: Twentieth century winter changes in Southern Hemisphere synoptic weather modes. Advances in Meteorology, Article ID 353829, 16pp, doi:10.1155/2011/353829; Cai, W., T. Cowan, A. Sullivan, J. Ribbe, and G. Shi, 2011: Are anthropogenic aerosols responsible for the northwest Australia summer rainfall increase? A CMIP3 perspective and implications, Journal of Climate, 24, 2556–2564, doi:10.1175/2010JCLI3832.1. Rotstayn, L. D., S. J. Jeffrey, M. A. Collier, S. M. Dravitzki, A. C. Hirst, J. I. Syktus, and K. K. Wong, 2012: Aerosol- and greenhouse gas induced changes in summer rainfall and circulation in the Australasian region: a study using single-forcing climate simulations. Atmos. Chem. Phys., In press (Neville Smith, Bureau of Meteorology)	The information on rainfall change is now presented in Table 25-1, Row 4. The text no longer includes detailed discussion on causes of past rainfall changes due to space restrictions.
165	42502	25	7	47	7	47	Do Jones et al (2009) say the reasons are poorly understood or is that a judgement of the IPCC authors? Readers may want to know whether it's a mystery that hasn't been explored or something that has been investigated with a number of unresolved theories. Did Nicholls (2006) address this? What about theries related to increasing Asian aerosols affecting the monsoon (see http://www.atmos-chem-phys-discuss.net/12/5107/2012/acpd-12-5107-2012.pdf) (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The information on rainfall change is now presented in Table 25-1, Row 4. The text no longer includes detailed discussion on causes of past rainfall changes due to space restrictions.
166	38653	25	7	47	7	48	See also Rotstayn et al (2012) Aerosol- and greenhouse gas-induced changes in summer rainfall and circulation in the Australian region. Atmps Chem Phys 12: 6377-6404. (Janice Lough, Australian Institute of Marine Science)	The information on rainfall change is now presented in Table 25-1, Row 4. The text no longer includes detailed discussion on causes of past rainfall changes due to space restrictions.
167	42503	25	7	48	7	48	Is there a post-2004 update to the NZ rainfall trends from 1950-2004? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We are unaware of any more up-to-date studies on past rainfall changes for New Zealand.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
168	42298	25	7	50	0	0	This is the first of (I think) 5 mentions of ENSO and its phases in the chapter. All references are to links between El Nino or la Nina being associated with extreme events or dominating pattern. Yet the chapter does not confront the fundamental problem that we are still ignorant about how the events are triggered and whether the frequency and intensity of different phases are increasing or decreasing. The glaobal cc models can not and do not confront systems properties like ENSO (and related higher order fluctuations like IPO PDO, SAM). Our analysis of of the IPCC CC models showed that a minority of them could successfully predict ENSO fluctuations over the past 100 years, and completely divergent predictions for ENSO in the upcoming 100 years (Bragg et al. 2009, Moller et al. 2010). You may prefer not to cite this grey literature (3 papers are currently in late stage of publication in international peer reviewed journals). However you could assert from first prionciples that this is a key gap in understanding and one of particular significance from Australia and NZ and many of the pacific islands and pacific rim nations. References: Bragg, C.; Clucas, R.; Fletcher, D.; Mckechnie, S.; Moller, H.; Newman, J.; Scott, D. Sustainability of Tītī harvesting by Rakiura Māori. A report to Rakiura Māori for community peer review. University of Otago. 118 pp. + x. (June 2007); ... Moller H.; Fletcher D.; Newman J.; Clucas R.; Bragg, C.; McKechnie, S.; Lyver, P.O'B.; Scott, D.; Downs, T. Will the tītī remain plentiful enough for the mokopuna? A sustainability assessment of the Rakiura Māori tītī harvests. Pp 192-200 in: Taonui R.; Kahi, H.; Deeming, C.; Kururangi, K.; Cooper, G.; Ratahi, L.; Royal, M.; Taonui, R.; Haenga, M.; Bray, J. (Editors). Ngā Kete a Rēhua Inaugural Māori Research Symposium Te Waipounamu 2008. Published by Aotahi: School of Māori and Indigenous Studies, University of Canterbury (2010) (Henrik Moller, University of Otago)	Section 25.3, paragraph 2, now addresses the principal drivers of climatic variability in the region, including ENSO. Some text is now given to issues associated with climate models' ability to represent ENSO, although this discussion is limited due to space restrictions.
169	41497	25	7	53	8	10	As I have already suggested for the temperature projections paragraph, I think it would be helpful to your readers if you clarify in this paragraph whether the various scenarios you discuss are only scenarios with no policy-driven reductions in GHG emissions (ie SRES-type scenarios), or include "stabilization scenarios' with policy-driven emissions reductions. (David Wratt, NIWA, New Zealand)	The text has been substantially reduced as a space-saving measure. However, we now include cross references to WGII chapter 21 and WGI chapter 14 where readers can read about models and scenarios. See section 25.3, paragraph 3.
170	49308	25	8	1	0	0	What is meant by "significant spread"? Too imprecise. (Graeme Pearman, Monash University)	The information on rainfall change is now presented in Table 25-1, Row 4. The text no longer includes detailed discussion on the projected rainfall changes due to space restrictions.
171	49309	25	8	3	0	0	Is this "WG1 or WGI? (Graeme Pearman, Monash University)	Spelling and typographical issues will be addressed at the copy editing stage.
172	37491	25	8	3	8	3	I don't understand how downscaling could say anything about projections of future changes in rainfall over large areas such as southern Australia - changes that are likely due to large-scale changes in synoptic patterns and not due to topography or small-scale circulation changes that are important for downscaling (Will Steffen, The Australian National University)	The information on rainfall change is now presented in Table 25-1, Row 4. The text no longer includes detailed discussion on the projected rainfall changes due to space restrictions.
173	46531	25	8	4	8	5	"remains uncertain (very high confidence)". Do not understand what VH confidence in something that is uncertain means (referring to uncertainty guidance). Suggest deleting the vh confidence assertion. (Neville Smith, Bureau of Meteorology)	Confidence statement has been removed and wording revised.
174	42504	25	8	4	8	8	Page 7 line 53 says rainfall will decline in southern Australia. Here, it says the direction of rainfall changes in eastern and northern Australia remains uncertain. It is unclear how eastern and southern Australia are geographically separated - define the quadrants - it might be better to refer to NE, NW, SE and SW. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We now give more region-specific examples of projected rainfall changes based on CMIP5 models; together with the maps this should be sufficient to clarify areas of uncertainty and where trends are consistent.
175	49310	25	8	7	0	0	Replace "are" with are projected to be", or something similar. (Graeme Pearman, Monash University)	The information on rainfall change is now present in Table 25-1 and the text has been substantially shortened as a space-saving measure. The text that was on page 8 line 7 is no longer included.
176	49311	25	8	13	0	0	"RCP8.5" appears out of nowhere in this text. Needs explanation. (Graeme Pearman, Monash University)	As the RCP emission scenarios are in common use throughout the WGII report, we do not believe that they require further explanation here.
177	42505	25	8	24	8	25	These values seem very precise, but it's OK if they are simply quoted from the reference (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	These numbers now appear in Table 25-1, Row 4, and are directly from MfE (2008).
178	41134	25	8	31	8	31	"Depending on location, rainfall extremes have either increased or decreased..." I prefer more formal statistical language to be used. For example rather than 'increase' and 'decrease', please say 'statistically significant increase', 'statistically significant decrease' or 'no statistically significant change'. (Seth Westra, University of Adelaide)	The information on changes to rainfall extremes is now present in Table 25-1. As a space-saving measure, we do not routinely refer to "statistical" significance for entries in the table, except where it was considered especially relevant for the interpretation.
179	46532	25	8	31	8	33	This message is repeated at lines 37-39. Suggest moving lines 37-39 to 31 and remove redundancy. (Neville Smith, Bureau of Meteorology)	The information on changes to rainfall extremes is now present in Table 25-1. The final column briefly discusses changes in extremes relative to mean changes.
180	38654	25	8	31	8	35	Need to make clear referring to daily extremes (Janice Lough, Australian Institute of Marine Science)	The information is now present in Table 25-1, Row 5, which has a row heading "Precipitation extremes". This covers more than just daily extremes.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
181	41130	25	8	31	8	35	In this paragraph, please state the duration of the rainfall event which has been studied; from memory all the studies only focus on daily rainfall. Also note that [Westra., S. & Sisson, S.A., 2011, "Detection of non-stationarity in precipitation extremes using a max-stable process model", Journal of Hydrology, 46(1-2), doi: 10.1016/j.jhydrol.2011.06.014] studied the problem of daily rainfall trends using a spatial extreme value model, which unlike the studies currently cited allows confidence intervals to be specified and therefore is a more theoretically sound approach for determining: (1) whether there is a change in annual maximum precipitation under the null hypothesis that there is no change; and (2) what the confidence intervals are, allowing for comparison with climate model studies. One of the outcomes of this study was that no trends in daily rainfall could be observed in Australia, except possibly for a decrease in southwestern Western Australia. Consideration of this study for the report I feel is essential. A recent study just released to the Journal of Climate looking at the most complete record of quality-controlled daily rainfall collected globally also does not find evidence for increasing trends in daily rainfall in Australia [Westra, S., Alexander, L.V. & Zwiers, F.W., "Global increasing trends in annual maximum daily precipitation", submitted to Journal of Climate on 27th July 2012]. Note that I am happy to provide this latter manuscript on request. (Seth Westra, University of Adelaide)	The information on changes to rainfall extremes is now present in Table 25-1 and durations are now stated, and the lack of trends in daily time series noted and some of the reference the reviewer referred to are used. There has been a substantial reduction in text on this topic, due to space-saving requirements.
182	41131	25	8	31	8	35	A second concern with this paragraph is that no statement is made on possible changes in sub-daily rainfall. Two recent studies on this topic are: [Westra., S. & Sisson, S.A., 2011, "Detection of non-stationarity in precipitation extremes using a max-stable process model", Journal of Hydrology, 46(1-2), doi: 10.1016/j.jhydrol.2011.06.014] and [Jakob, D., Karoly, D.J. & Seed, A., 2011, Non-stationarity in daily and sub-daily intense rainfall - Part 2: Regional assessment for sites in south-east Australia, Natural Hazards and Earth Systems Science, 11, 2273-2284]. Both studies show much stronger increases at sub-daily timescales compared with daily timescales, and therefore is onsistent with the modelling study by Abbs and Rafter (2009) in the subsequent paragraph. Another recent paper by [Hardwick-Jones, R., Westra, S. & Sharma, A., 2010, Observed relationships between extreme sub-daily precipitation, surface temperature and relative humidity, Geophysical Reseach Letters, 37 (L22805)] also shows much higher sensitivies of precipitation at short durations. I feel a discussion of the relationship between changes in extreme rainfall and the duration of the rainfall event is mandatory, since it has a major influence on the sorts of flood hazards (i.e. flash floods vs longer-duration floods) which are most likely to change. The adaptation options if the biggest changes are at very short timescales (where it is difficult to provide early warnings and the speed of the flood wave can cause hazards for human life) are different to longer timescales (where the costs are significant but it is usually possible to evacuate people and thus the hazards are lower). (Seth Westra, University of Adelaide)	The entry in Table 25-1 now includes the statement: "a tendency to significant increase in annual intensity is evident in recent decades for shorter duration (sub-daily) events." with a reference to Westra & Sisson (2011) and Jakob et al (2011). We also now concluded that projected increases in annual daily extremes is low confidence, which is consistent with SREX and WGI draft. However based on material based in those reports and additional recent literature (cited in Table 25-1 and including some work referred to by this reviewer), we conclude that increases in subdaily rainfall extremes and 1 in 20 year daily extremes is 'medium confidence'.
183	46533	25	8	33	0	0	25.3.4 should be 25.3.3 (Neville Smith, Bureau of Meteorology)	The information on changes to rainfall extremes is now present in
184	42506	25	8	34	8	34	IPCC style normally puts the reference(s) at the end of the sentence, rather than at the front. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This text has now been deleted as a space-saving measure.
185	41498	25	8	37	0	0	I suggest you begin this sentence with the words "In future" to make it clear the model results etc you are discussing in this paragraph are not for the past (observing) period discussed in the previous paragraph. (David Wratt, NIWA, New Zealand)	The information on changes to rainfall extremes is now present in Table 25-1. This text has now been deleted as a space-saving measure.
186	42507	25	8	37	8	38	Some models give decreases in extreme daily rainfall where mean rainfall decreases are large, e.g. in SW Australia. The projection is sensitive to the region, season and the definition of "extreme", e.g. 99th precentile rainfall decreases over a number of regions, but 1-in-20 year rainfall decreases over very few regions. See CSIRO and BoM (2007) and Rafter and Abbs (2009). (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The information on changes to rainfall extremes is now present in Table 25-1. The following entry in the final column of Row 5 (on precip extremes) briefly discusses this point. It says: "The sign of observed trends mostly reflects trends in mean rainfall (e.g. there is a decrease in mean and daily extremes in SW Aus). Similarly, future increases in intensity of extreme daily rainfall are less likely where mean rainfall is projected to decline."
187	49313	25	8	48	0	0	Suggest “rainfall-based”. (Graeme Pearman, Monash University)	The information on changes to drought is now present in Table 25-1. The words "rainfall based" are no longer used.
188	49314	25	8	48	0	54	There should be some mention that there has been a changed seasonality and that this can be more significant than a change in total amount. Also that there is a non proportional relationship between rainfall and water availability. (Graeme Pearman, Monash University)	The information on rainfall change is now contained within Table 25.1. This refers to the fact that the decrease is strongest in late Autumn.
189	42508	25	8	48	8	48	no significant trends over the period 1900-2007 (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Suggestion incorporated in Table 25-1.
190	41132	25	8	48	9	5	Please be more precise about the type of drought which is being referred to in each section. In particular, do the authors refer to meteorological drought, hydrological drought, or agricultural drought? Note that the climate forcing variables (precipitation deficit, evapotranspiration) are different for the different definitions of drought, and therefore different types of drought are likely to change in different ways in the future. (Seth Westra, University of Adelaide)	Suggestion incorporated in Table 25-1.
191	41499	25	8	50	0	0	Please explain in a few words for your readers what you mean by "hydrological terms" - ie river flows? Soil moisture ? (David Wratt, NIWA, New Zealand)	The information on changes to drought is now present in Table 25-1. The brief comment in the final column of the relevant row now says "Regional warming may have led to an increase in hydrological drought" and references Cai & Cowan (2008) and Nicholls (2006) for further information.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
192	46534	25	8	51	0	0	The high confidence here contrasts with the medium confidence of SREX (but noting the latter included NZ), and the evidence cited is completely different. The two accounts should be reconciled. (Neville Smith, Bureau of Meteorology)	The text primarily cites regional studies not available or used in SREX (which concentrated on global studies). We include now a reference to SREX and WGI Chapter 12, and (based considerations disucssed in those reports) have reduced our confidence to 'medium'.
193	38655	25	8	51	9	2	"Drought occurrence is projected to increase....." Does this mean become more frequent and/or be more intense? Need to clarify. (Janice Lough, Australian Institute of Marine Science)	Relevant statements in Table 25.1 has been modified to make it clear that changes in drought frequency is intended
194	42509	25	8	54	9	2	These results are for a very rare 1-in-20 year drought, so the projected increase in frequency is relative to a low base frequency (5%). I think the results of Kirono et al (2011) could be summarized a bit better. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	1 in 20 year is not an unusal freqquency for defining drought. Due to the need to minimise text length in the table, the reader is referred to the references for details of the basleline drought frequency considered.
195	42510	25	9	10	9	10	some readers won't understand "at 2 and 10m" so add "above the ground". (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The information on changes to observed winds in Aus is now present in Table 25-1. The text in the Table now reads "but inconsistent trends in wind observations since 1975" with reference to McVicar et al (2008) and Troccoli et al (2012) for further information.
196	43715	25	9	15	9	16	This sentence can be read as directly linked to the previous one but it is covering a different time period, ozone loss was not significant back in 1960, and the references are papers covering different aspects. So I think there should be a slightly clearer separation in the way they are written. (Martin Manning, Victoria University of Wellington)	The information on changes to observed winds in NZ is now present in Table 25-1. The text on changes to mean winds and extreme winds has been separated into two cells of the relevant table Row.
197	42511	25	9	18	9	18	mean and extreme (99th percentile) wind speeds for 2081-2100 … (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	A reference to changes in extreme winds has now been added.
198	42512	25	9	24	9	24	define extreme (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The information on projected changes in mean and extreme wind for NZ is now present in Table 25-1. The text now reads "Mean westerly winds and extreme winds (based on projected changes in circulation patterns) are projected to increase, especially winter" with reference to MfE (2008) and Mullan (2011) for more information.'
199	43716	25	9	25	0	0	The Mullan et al, 2011 paper is being cited several times and this is not readily available from either MAF (or MPI as it is now called) or from NIWA. There is probably no way around this but it is disappointing that so much of the coverage of NZ has to be based on reports that have not been subject to peer review and meet the standards used elsewhere. Also several other papers are being cited here as submitted or in press but are not available for the expert review process. (Martin Manning, Victoria University of Wellington)	The Mullan et al (2011) report is now available at http://www.niwa.co.nz/our-science/climate/research-projects/risk of-drought-and-extreme-winds-under-climate-change. The report was included in the grey lit reports uploaded to the WGII document depository.
200	49830	25	9	30	9	30	Sea level is not rising if you take only the recent measurements where GPS level;ling has corrected previous bias.The Seven Station Series 2011 Energy and Environment Vol 22 page s 429-439.) (Vincent Gray, Climate Consultant)	Rejected. It is well documented that sea level in the region has been rising at 1-2 mm/yr over the past century (work of CSIRO and Hannah & Bell, 2012, and satellite based measurements reported by Topex/Poseidon), but there are local variations in relative sea-level rise due to local vertical land mass movement which can affect individual gauges. At shorter periods of several years, variability from interannual and inter-decadal climate cycles, can produce a wider range of short-term trends, including interludes of negative or no trend. For the modern record, the satellite altimetry over the past 19 years, adjusted for Glacial Isostatic Adjustment (GIA), continues to show absolute (eustatic) sea level is rising at a global average rate of 3.2 mm/yr over this shorter recent period.
201	42513	25	9	32	9	32	the trends derived by Church et al (2006) are being updated, so keep an eye out for a new paper (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The table now includes a references to Burgette et al (submitted) for the observational period 1900-2011
202	48697	25	9	34	9	35	Using updated Peltier (2004) corrections for GIA [rather than Peltier(2001) used by Hannah(2004)], the average for New Zealand is 0.3 mm/yr, as implicitly shown by Figure 1 in the already quoted Hannah & Bell (2012) paper. So sentence should read "With an estimated 0.3 mm/yr for glacial isostatic adjusment in the New Zealand region (Hannah and Bell, 2012), this yields an absolute SLR estimate of approximately 2.0 mm/yr." (Robert Bell, NIWA)	Suggestion incorporated in Table 25-1.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
203	42514	25	9	35	9	35	how much faster? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The information on projected changes in mean sea level is now present in Table 25-1, Row 8. The text in the final column now reads "Satellite estimates of SLR for 1993-2009 are significantly higher than those for 1920-2000, partly due to atmospheric circulation changes" with reference to Hannah & Bell (2012), CSIRO & BOM(2012) and Power & Smith (2007) for more information. Detailed information about recent rates of change in SLR have been omitted, as a space-saving measure.
204	48698	25	9	35	9	37	A very recent published paper, Meyssignac and Cazenave (2012) is Section 7 concludes in relation to the Pacific that intrinsic variability of the climate system is still the main driver of spatial patterns in sea level observed during the satellite altimetry era. So the sentence should include this Reference, and change "partly reflecting ..." to "mainly reflecting ...". Full citation: Meyssignac, B., A. Cazenave 2012: Sea level: A review of present-day and recent-past changes and variability. Journal of Geodynamics 58: 96-109, doi:10.1016/j.jog.2012.03.005 (Robert Bell, NIWA)	Suggestion incorporated in Table 25-1, and reference added.
205	45119	25	9	37	0	0	This doesn't say what the projection for SLR actually is regionally. It would be good to state some lower/higher bound scenarios, along the lines but updated from the CSIRO/ACE website ones cited in the DCCEE Coastal Assessment (Table 2.1, p.27 in Department of Climate Change (2009). 'Climate change risks to Australia's coast: a first pass national assessment.' (Commonwealth of Australia: Canberra.) (http://www.climatechange.gov.au/publications/coastline/climate-change-risks-to-australias-coasts.aspx)) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Our view is that there is not the literature to support any quantitative regionally specific SLR statements in addition to the material available in WGI Chapter 13. WGI is cross-referenced.
206	41133	25	9	43	9	44	"...with changes in significant wave height and storms playing a more minor role." Do the authors mean 'storm surge' rather than 'storms'? This seems a more precise term given that the discussion is on sea level. Note that if 'storms' increase this does not necessarily mean that storm surge will also increase, depending amongst other things on the dominant wind direction. Therefore the authors need to comment on the variable that directly influences flood risk. (Seth Westra, University of Adelaide)	Suggestion incorporated in Table 25-1.
207	49315	25	9	45	0	0	"allowing for" What does this mean? (Graeme Pearman, Monash University)	The information on projected changes in extreme sea level is now present in Table 25-1. The text "even allowing for a decrease in the frequency of driving storms" has now been omitted.
208	46535	25	9	46	0	0	SREX referenced Sheffield and Wood (2008), Jung et al (2010) and Dai (2011) for Australia, and provided a good explanation of drought. That information would improve this sub-section. (Neville Smith, Bureau of Meteorology)	These references used in SREx are all global studies. Here we refer to more detailed regional studies in Table 25-1.
209	49316	25	9	50	0	0	"asl" in full, and again note the spaces needed after numerals and before units in this paragraph. (Graeme Pearman, Monash University)	The information on projected changes in extreme sea level is now present in Table 25-1. The abbreviation "asl" has now been omitted. Spelling and typographical issues will be addressed at the copy editing stage.
210	42515	25	9	51	9	51	some readers won't know what stations are, so change stations to weather stations or sites (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Suggestion incorporated in Table 25-1.
211	41500	25	9	53	0	0	I repeat my suggestion from line 8 of Page 3: I suggest replacing "fire weather" with "the frequency of conditions conducive to forest fires" since some readers might not be familiar with the term. (David Wratt, NIWA, New Zealand)	We continue to use the term "fire weather" as this has a well-defined technical meaning and is now also included in the glossary.
212	46536	25	9	53	0	0	Not sure what "Fire weather has increased" means. Changes in extreme heat, yes. Increases in the FDI, yes. Fire weather warnings might be issued when weather conditions (Wind, temperature, humidity) are conducive to the spread of dangerous bushfires, so is the finding of an increase in fire weather based on the record of warnings? I don't think fire danger and fire weather should be used interchangably. (Neville Smith, Bureau of Meteorology)	We continue to use the term "fire weather" as this has a well-defined technical meaning and is now also included in the glossary. We no longer use the term fire danger because it is ill-defined.
213	42516	25	10	4	10	5	Lucas et al (2007) found that by 2020, the number of extreme fire danger days generally increases 5-25 per cent for a low emission scenario (B1) and 15-65 per cent for a high scenario (A1FI). By 2050, the increase is 10-50 per cent for B1 and 100-300 per cent for A1FI. Site-specific examples are given in the Appendix. These numbers are more relevant for ris assessment than the number of very high fire danger days. In addition, the meteorological conditions associated with the most extreme fire weather behaviour (linked to the extreme fire weather cases) were diagnosed from climate models (Hasson et al., 2009). Applying this analysis to the output of ten climate model simulations of the 21st century, using low (B1) and medium-high (A2) greenhouse gas emissions scenarios, suggests that the frequency of such events will increase from around one event every two years during the late 20th century to around one event per year in the middle of the 21st century and one to two events per year by the end of the 21st century. In addition to a greater overall increase under the medium-high emissions scenario, the rate at which the increase occurs amplifies during the second half of the century, whereas under the low emissions scenario the number of extreme cases stabilizes, although still at a higher rate than that experienced in the late 20th century. Hasson A, Mills G, Timbal B, Walsh K. 2009. Assessing the impact of climate change on extreme fire weather events over southeastern Australia. Clim. Res. 39: 159-172. Fire weather projections beyond SE Australia were explored by Hamish G. Clarke, Peter L. Smith, Andrew J. Pitman, (2011) Regional signatures of future fire weather over eastern Australia from global climate models. International Journal of Wildland Fire 20:4, 550 (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The text on fire has been much reduced in the interest of space and included only in Table 25-1. The numerical results given in the table are an example only and the very high fire danger case was chosen as it has a larger sample and is more comparable with the NZ results.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
214	49317	25	10	5	0	0	Reword “Climate model simulated changes”. (Graeme Pearman, Monash University)	The information on projected changes in fire danger is now present in Table 25-1. The text "Climate model simulated changes to weather systems and sea surface temperature patterns have also been shown to increase fire weather occurrence" has now been omitted, as a space-saving measure.
215	37492	25	10	8	10	8	I suggest removed the 400% and 600% in brackets. They don't add any additional information and such percentages are not included in the Australian estimates of increased fire danger weather. (Will Steffen, The Australian National University)	The information on projected changes in fire danger is now present in Table 25-1. For consistency between Aus and NZ, percentage changes only have now been used.
216	46537	25	10	15	0	0	The interpretation of observations is affected by data availability, not the observations themselves. (Neville Smith, Bureau of Meteorology)	The information on projected changes in fire danger is now present in Table 25-1. The text "Observations of extreme events such as severe thunder storms, tornadoes and tropical cyclones are significantly affected by data availability and biases due to changes in population, and measurement quality, quantity and practice" has now been omitted, as a space-saving measure.
217	49318	25	10	15	10	16	Suggest reword. (Graeme Pearman, Monash University)	The information on projected changes in fire danger is now present in Table 25-1. The text "Observations of extreme events such as severe thunder storms, tornadoes and tropical cyclones are significantly affected by data availability and biases due to changes in population, and measurement quality, quantity and practice" has now been omitted, as a space-saving measure.
218	37493	25	10	17	10	17	Remove the comma after "Recent studies" (Will Steffen, The Australian National University)	The information on projected changes in tropical cyclones is now present in Table 25-1. The text now reads "No regional change in the number of tropical cyclones (TCs) or in the proportion of intense TCs over 1981-2007" with reference to Kuleshov et al (2010) for further information.
219	46538	25	10	18	0	0	Knutsen et al (2010) and SREX (Seneviratne et al) attached low confidence to any increases. Not clear that this assessment has the evidence for medium confidence in no change. (Neville Smith, Bureau of Meteorology)	Checking the the SOD of Chpater 14 WGI, we agree 'low confidence' is more appropriate, and the relevant text in Table 25.1 has been modified accordingly.
220	38656	25	10	19	10	20	Need to be specific that Callaghan & Power (2011) study refers to NE Australia; also note that for marine ecosystems it is not just landfalling tropical cyclones that are significant, e.g. Great Barrier Reef affected by 6 severe tropical cyclones in the period 2005-2011 (GBRMPA 2011 Extreme Weather and the Great Barrier Reef http://www.gbrmpa.gov.au/__data/assets/pdf_file/0016/14371/GBRMPA-Extreme-weather-report-Final-R3b-LowRes.pdf (Janice Lough, Australian Institute of Marine Science)	Suggestion on geographic clarification incorporated in Table 25-1. We do not discuss non-landfalling TCs due to space restrictions.
221	49320	25	10	21	0	0	“or stay similar” is this the same as the Summary? (Graeme Pearman, Monash University)	We indeed intended to include 'or stay similar' in both Table 25.1 and the ES, but this was not added to the ES due to an oversight in preparing the final SOD version. This will be corrected in the final government draft of this chapter.
222	48699	25	10	28	10	30	From the Mullan et al. (2011) report, the future period should be 2070-2100 (not 2020 to 2100) and should include a final phrase " … with the largest increases over the South Island." as the report does in Exce Summary (Robert Bell, NIWA)	Suggestion incorporated in table 25.1.
223	41501	25	10	29	0	0	Pleaase explain whether the "increase" you refer to at the beginning of this line is in frequency, or in intensity, or both. (David Wratt, NIWA, New Zealand)	The projected increase corresponds to the occurrence of "conditions conducive to convective storm development". The text in Table 25.1 has been modified to make this clear.
224	36431	25	10	29	30	0	the significance of severe storms in NZ historically has been re soil erosion events, notably 1938 and 1987 (Cyclone Bola): northerly storms on erosion prone parts of the eastern North Island (Eric Pawson, University of Canterbury)	This is a good point, but beyond the scope of Section 25.2.
225	42517	25	10	30	10	30	Given the high vulnerability of Australia and New Zealand to severe storms, would it be reasonable to say that more comprehensive risk assessments are needed? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This is a good point, but beyond the scope of Section 25.2. Risks associated with uncertainties in projections of storms are mentioned in Section 25.11.
226	42518	25	10	35	10	40	Updated results for Victoria for a broader range of AR4 models will be published in 2012. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This new work was not available for citation at the time of submission of the SOD.
227	41502	25	10	42	10	47	A further relevant paper which you have not listed is: Chinn, T., Fitzharris, B.B., Willsman, A., and Salinger, M.J., 2012: Annual ice volume changes 1976-2008 for the New Zealand Southern Alps. Global and Planetary Change 92-93, pp 105-118. I suggest you add this reference, and if necessary modify the text in this paragraph to take into account the findings of this paper. (David Wratt, NIWA, New Zealand)	Reference now included.
228	49319	25	10	49	0	54	This is the first use of “submitted” papers which I take is unacceptable unless publication is approved before this report goes to press? (Graeme Pearman, Monash University)	This paper is now published. Use of submitted papers is acceptable for the SOD but yes they have to be published to remain in the final draft.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
229	42519	25	10	49	10	49	Also cite Hendrikx and Hreinson (2010) (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The recently published Hendrikx and Hreinson (2012) paper (which we assume is what is being referred to here) concerns implications of projected changes to snow water equivalence (as reported in the Hendrikx et al., 2012 paper which is cited) on snow-making. We do not discuss snow-making here, so have not included the suggested reference (but it is included in the tourism section 25.7.5).
230	43717	25	10	49	10	51	Sentence would be more readable if it did not switch from "decrease by" to "change by" with a switch in the sign meaning that the values are consistent. (Martin Manning, Victoria University of Wellington)	The information on projected changes in peak snow accumulation for NZ is now present in Table 25-1. The example given is now only for 2090, when the projected changes at both 1000 and 2000m are both negative.
231	41503	25	11	1	0	0	Before you leave the Section 25.3 topic of observed and predicted climate change, I suggest you add a brief Section 25.3.11 headed "Changes in ocean pH" or "Changes in Ocean Chemistry. This would cover observed changes to date and predicted changes. Although the relevany literaturefor the Australasian region is limited, I think there is enough to enable some assessment of this important topic. (David Wratt, NIWA, New Zealand)	We assessed the material available on this topic to be insufficient to justify an additional row in Table 25.1 to deal with ocean acidification. Reference to additional topics and cross references are now included in the caption to Table 25.1., with acidification mentioned as an example.
232	41504	25	11	1	0	0	(Continued from previous comment): Somerelevant NZ publications include "Boyd, P.W. and Law, C.S., 2011: An Ocean Climate Change Atlas for New Zealand Waters. NIWA Informatio Series No 79, 22pp." (Page 6 contains a figure showing observed decrease in pH off Otago, 2000-2008). Page 6 of the Lundquist et al paper already in the Ch25 reference list contains some discussion of observed varations and changes in ocean pH for NZ. Hopefully thereare also some relevant publications for Australia. (David Wratt, NIWA, New Zealand)	We assessed the material available on this topic to be insufficient to justify an additional row in Table 25.1 to deal with ocean acidification. Reference to additional topics and cross references are now included in the caption to Table 25.1., with acidification mentioned as an example.
233	45120	25	11	5	0	0	It would be good to add a sentence here about indigenous demographics, perhaps urban and rural/remote for Australia at least. Cf. John Taylor ANU (e.g. Brown, D., Taylor, J., and Bell, M. (2008). The demography of desert Australia. The Rangeland Journal 30, 29-43.) or ABS (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Sub-sections have been condensed to save space and re-ordered to provide a more natural grouping of information on demographics and other social aspects relating to indigenous populations.
234	48935	25	11	5	11	20	section 25.4.1 - wonder whether it is worth expanding the changing demography of agri-centred regions (line 19) with some consideration of implications for agricultural production, and including the possibility of climate change driven migration to (coastal) zones where relatively benign climate change is expected (line 20) with implications for local government planning of land-use / zoning, infrastructure provision etc. Links to - positive consequences for some sectors & sub-regions (p41, lines 22/26) (Leon Soste, Department of Primary Industries, Victoria, Australia)	Given space constraints, we consider that this is too much detail for the purpose of this section, which intends to broadly set the scene. Where relevant, some of those points are picked up in other parts of the chapter relating to coastal issues and rural areas.
235	49321	25	11	7	0	0	“important socioeconomic factors”. (Graeme Pearman, Monash University)	Sentence reworded based on this suggestion.
236	49322	25	11	8	0	0	Period after the parenthesis. (Graeme Pearman, Monash University)	Done
237	36062	25	11	10	11	14	I think you should state whether NZ Stats have taken climate change into account in their calculations and, if so, what parameters/assumptions did they use (eg IPCC 2007?). If they did not, then that should be noted because, in the context of this report, it could be misleading. Its not just a question of population count, migration might also affect the age distribution. (Brad Field, GNS Science)	There is no clear evidence whether climate change scenarios were considered in official population projections. As outlined in other sections, the literature cannot substantiate claims that climate change would definitely change migration patterns, and inward migration already depends on migration policy far more than migration demand.
238	49323	25	11	16	0	0	I wonder about the value of referring to the “Australasian population” here, given the numerical dominance of the Australian population. (Graeme Pearman, Monash University)	Australia and NZ are very similar with regard to urbanisation and coastal concentration, hence this summary term is appropriate here. No change made.
239	35531	25	11	23	11	39	It might be noted that Australia relies very heavily upon domestic coal, both black and brown, for electricity, propelling it to having the highest greenhouse gas emissions of any developed country. It also constitutes the largest exporter of coal in the world, thereby outsourcing many emissions to various other countries, particularly Japan, South Korea, Taiwan, and China (See Burgmann and Baer 2012:46-48). Furthermore, the high consumption pattern of Australia is also an overall source of greenhouse gas emissions on many fronts, including heavy reliance on automobiles and airplanes for transport, many large dwelling units, meat consumption, etc (Burgmann and Baer 2012:46-52). Burgmann, Verity and Hans A Baer. 2012. Climate Politics and Climate Movement in Australia. Melbourne: Melbourne University Press. (Hans Baer, University of Melbourne)	The relevance of this comment for this section and chapter is not clear. GHG emissions do not fall within the mandate of WGII unless they are clearly related to impacts of climate change and/or adaptation. This does not appear to be the case for the specific comment being made here.
240	51516	25	11	27	11	27	It would be helpful to clarify the percentages given. Are these percentages of GDP, exports, etc.? (Katharine Mach, IPCC WGII TSU)	It is percentage of the value of exports; text changed accordingly.
241	42267	25	11	30	0	31	Citing New Zealand GDP data only as far as 2003 is unnecessary. Newer data is available from Statistics New Zealand. See the following: http://www.stats.govt.nz/browse_for_stats/economic_indicators/GDP/GrossDomesticProduct_HOTPMar12qtr.aspx The ABS would also have newer data for Australia. (Adolf Stroombergen, Infometrics)	GDP data have been updated with the latest available official data from both countries.
242	42520	25	11	30	11	30	Define "real GDP" (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Real GDP is inflation corrected; since this is the standard measure for GDP trends, we deleted "real" to avoid unnecessary technical jargon.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
243	42521	25	11	40	11	40	Would it be appropriate to include greenhouse gas emissions by sector for each country, since this are closely linked to economic activity and consumption? Greenhouse gas mitigation is mentioned in this chapter, so it would be helpful to see some baseline emission values. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Given space constraints, we do not feel this is sufficiently relevant since the link between GHG emissions in any individual country and vulnerability/adaptation to climate change impacts is not well substantiated in the literature, and the direct links where they exist (in fossil fuel energy generation) is discussed elsewhere in the chapter.
244	36432	25	11	44	45	0	why? This is an assertion. (Eric Pawson, University of Canterbury)	We respectfully disagree. This is well substantiated and a core tenet of the literature (see AR5 Chapters 11-13, 19, 20, and studies cited in this section). However, due to space constraints and the almost obvious nature of this statement, this sentence has been removed.
245	49324	25	11	45	0	0	Capitalise “Chapters 11”. (Graeme Pearman, Monash University)	Done
246	45121	25	11	46	0	0	?? And Oz too? (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Based on OECD (2011), inequality grew markedly during that period in New Zealand but not in Australia. No change made.
247	45122	25	11	51	0	0	Was expecting this in 25.4.1. Could add urban vs rural/remote since this affects their vulnerability (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Section has been condensed and re-ordered to allow a more natural grouping of information on indigenous peoples; information on concentration in remote regions of Australia has been added.
248	49325	25	11	52	0	0	Suggest, “population respectively. The Indigenous peoples…”. (Graeme Pearman, Monash University)	Sentence has been revised, comment no longer directly relevant.
249	49326	25	12	1	0	0	Suggest “implying that their adaptive capacity”. (Graeme Pearman, Monash University)	Wording changed accordingly.
250	46539	25	12	7	0	0	Since vulnerability and adaptive capacity effectively include these factors by definition, the very high confidence level does not convey much, if anything at all. (Neville Smith, Bureau of Meteorology)	Wording revised and confidence statement removed.
251	42522	25	12	7	12	8	put confidence statement at the end of the sentence (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Wording revised and confidence statement removed, following the suggestion by another reviewer that these factors are included by definition and hence the confidence statement does not convey much useful information.
252	49327	25	12	19	0	25	This is a place where there may be a problem with the lack of contact with the non-academic literature as mentioned in the general comments.. There have been numerous polls of the Australian community showing their attitudes and how these have been changing over time with regards to climate change and taking adaptive actions. These are not peer reviewed articles, but many of them have as much legitimacy and rigour as many of the non-journal articles referred to in this Chapter. These are missing in this report. For example the most recent was released in the past few weeks by the Climate Institute (Sydney), and is called The Climate of the Nation. Further the reviewer is of the opinion that there should be a statement here about how physical science has dominated investigations about climate change and that the engagement with of social and behavioural scientists is to be encouraged. This is the topic of the paper: Härtel, C. and Pearman, G.I. (2010). Understanding and responding to the climate change issue: Towards a whole-of-science research agenda Journal of Management and Organization 16(1), 16-50. (Graeme Pearman, Monash University)	Box deleted and replaced by a fuller discussion in new Section 25.4.3.
253	41484	25	12	19	12	25	What do these surveys say about Australians' beliefs about climate change? Check Reser et al. 2012 for percentages + cite Leviston, Z. & Walker, I.A. (2011) Baseline Survey of Australian attitudes to climate change: Preliminary Report, CSIRO. What about attitudes to CC in New Zealand? Survey data? (Johanna Mustelin, Griffith University)	Box deleted and replaced by a fuller discussion in new Section 25.4.3.
254	49805	25	12	27	12	28	May I suggest an excellent reference to support this assertion regarding values: O'Brien, K., & Wolf, J. (2010). A values-based approach to vulnerability and adaptation to climate change. Wiley Interdisciplinary Reviews: Climate Change, 1(2), 232-242. doi: 10.1002/wcc.30 (Nadine Elizabeth White, Southern Cross University)	Box deleted and replaced by a fuller discussion in new Section 25.4.3.
255	41485	25	12	28	12	29	"There is as yet limited evidence but high agreement that for some parts of society, projected climate change impacts on landscapes and ecosystems will cause significant losses." What is this choice of given weight based on? The literature has long advocated that the impacts will be unevenly distributed and this means that significant losses will accrue to landscapes and ecosystems, which in turn impact more on other parts of society than others. There is therefore more than 'limited' evidence that this will occur. (Johanna Mustelin, Griffith University)	Box deleted and replaced by a fuller discussion in new Section 25.4.3. The specific wording has been revised and broadened, recognising the significant literature on place attachment, although relatively little of this literature deals explicitly with the impacts of climate change.
256	46540	25	12	34	0	0	“Some adaptation options … (high confidence)”. In this context, “Some” is equivalent to ‘An uncertain number of’, so attaching a confidence level seems to be meaningless. (Neville Smith, Bureau of Meteorology)	Confidence statement has been removed and wording revised.
257	52402	25	12	34	0	41	In Box 25-1, lines 34-41, p 12 there are arguably real problems with respect to a very selective use and reference to values, and the addressing and lumping of ‘mental well-being’, place attachment, and socio-economic development, and indigenous communities all in one sentence and statement, referring to Australia generally as well as indigenous Australian and communities (Box 25-1, lines 39-41, p 12). Again, the socio-economic arguments running through section 25.4 cannot and do not adequately address the matters raised, blithely ignore the very cogent criticism of such perspectives when dealing with human perceptions, experiences, and environmental impacts (e.g., Baserman et al., 1999). (Joseph Reser, Griffith University)	Box deleted and replaced by a fuller discussion in new Section 25.4.3, with the reviewer as contributing author.
258	46541	25	12	41	0	0	I do not see a section 12, or a subsection 25.x.12. (Neville Smith, Bureau of Meteorology)	This was meant to refer to the indigenous section, corrected.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
259	42523	25	12	45	12	49	cite Preston at al (2008) (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This omission was unintended, yes important reference here, included.
260	45123	25	12	49	0	0	Note some shortly forthcoming work from CSIRO: (i) economic analyses of inundation in SE Queensland - C.H.Wang et al; (ii) national scale economic analyses of impacts of 4 hazards on infrastructure (Heinz Schandl et al, CSIRO/DCCEE); (iii) work on economic impacts on land prices in SE Queensland (Cameron Fletcher, Ryan McAllister et al, CSIRO/DCCEE - the hedonic pricing papers are already out, impacts shortly - important because it reflects an appreciating asset rather than depreciating ones); also Stewart and Wang (2011) economic analyses of extreme wind risks and building standards in Queensland is already available and cited in the chapter. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Thanks for those references. Based on the growing literature, we have slightly reworded the existing text to indicate that the literature that integrates socio-economic considerations with quantitative impacts estimates is small but growing, and cite some of these studies. We don't cite all since we cannot aim to be comprehensive, rather provide key examples that support the overall assessment. Fletcher et al is now cited in Box 25-1.
261	48936	25	12	49	12	50	scenarios only infrequently used to quantify impacts or vulnerability - may care to add - 'or to guide policy development'. Implicit suggestion - there is an opportunity being missed here (Leon Soste, Department of Primary Industries, Victoria, Australia)	While we have sympathy for the suggestion, there is not sufficient evidence in the literature to substantiate the suggested addition, since the influence on policy may be indirect. Need to stick to what is actually evidenced in the literature.
262	36433	25	12	52	0	0	a notable exception is a recent U Canterbury PhD thesis by N Cradock-Henry (2011): Farm-level vulnerability to climate change in the Eastern Bay of Plenty, New Zealand, in the context of multiple stressors (Eric Pawson, University of Canterbury)	The work referred to did consider socio-economic factors but did not attempt to systematically explore future changes in those factors or apply any tests regarding their predictive power for observed vulnerability. Thus it falls into the category of limitations already mentioned in the text. A journal publication based on this thesis is now included in the sample list of studies that consider socio-economic influences on adaptive capacity, but do so with limitations.
263	46542	25	12	52	0	0	This paragraph would be a good lead in to this section, particularly as it frames the consideration in the context of climate change. (Neville Smith, Bureau of Meteorology)	Yes this would be one option but we prefer this to be the conclusion from this discussion. This is then highlighted as a key finding in the executive summary.
264	53574	25	13	5	0	0	Please ensure consistency with the adaptation chapters and with relevant sectoral chapters. (Kristie L. Ebi, IPCC WGII TSU)	Noted, thank you, we ensured consistency with the adaptation chapters as far as possible while those drafts are also undergoing significant revisions.
265	46543	25	13	9	0	0	Is adaptation driven by projected climate change? I think the message is meant to be … driven by perceptions of actual or expected climate change … (Neville Smith, Bureau of Meteorology)	Wording revised based on this suggestion.
266	39072	25	13	9	13	10	it is not clear how non-climate pressures have "driven" adaptation to climate change. Should this not be that the non-climate pressures have now included clamate change impact concerns and this has had momentum to adaptation initiatives and planning frameworks? (Pierre Mukheibir, University of Technology Sydney)	No, the point is that adaptation is never to climate change alone but to a multitude of climate and non-climate pressures. Wording revised to make this clearer.
267	45124	25	13	19	0	0	The support also includes resources for pilot studies, which are increasingly identified as critical in facilitating early movers (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Correct (for Australia), thank you, point added.
268	49801	25	13	19	13	19	I conducted a study of local governments in NSW where nearly 80% of respondents indicated their council had not conducted risk assessments for CC impacts. You may choose to insert a reference from the peer reviewed journal article that published the results. The ref is White, N. E. (2009). Local Government Planning Responses to the Physical Impacts of Climate Change in New South Wales, Australia. International Journal of Climate Change Impacts and Responses, 1(2), 1-16. The article can be freely downloaded from http://works.bepress.com/nadine_white/ (Nadine Elizabeth White, Southern Cross University)	This seems not applicable to the statement here, which is about how central/federal governments are supporing local/state level adaptation actions. It is useful though for the assessment of the diversity of local government responses to climate change and cited in the next section.
269	49328	25	13	23	0	0	Mention of the CSIRO's Flagship will have little or no meaning to people outside of CSIRO without explanation. And care needs to be made to indicate that significant activities are being generated within the universities, in part due to the NCCARF investment. It might be added that this investment is coming to an end as are investments in regional climate initiatives, and this is not a good sign. Is there a need to refer more widely to the NCCARF panning documents? (Graeme Pearman, Monash University)	This comments appears more relevant as a commentary on the state of research capacity in Australia and its future prospects, which is outside the mandate for this chapter. Given page constraints and the ready availability of additional information about CSIRO CAF and NCCARF we feel these short references are adequate here.
270	45125	25	13	27	0	0	reports for natural and managed landscapes - see also Dunlop et al 2012, very shortly forthcoming report on National Reserves . The policy summary and synthesis report of this should be released within days. (Dunlop M., Hilbert D.W., Ferrier S., House A., Liedloff A., Prober S.M., Smyth A., Martin T.G., Harwood T., Williams K.J., Fletcher C., and Murphy H. (2012) The Implications of Climate Change for Biodiversity Conservation and the National Reserve System: Final Synthesis. A report prepared for the Department of Sustainability, Environment, Water, Population and Communities, and the Department of Climate Change and Energy Efficiency. CSIRO Climate Adaptation Flagship, Canberra.) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Thank you, citation has bee added.
271	49329	25	13	28	0	0	Is there a better abbreviation for this reference? (Graeme Pearman, Monash University)	There might be, but this is specifically the referencing format requested by the authors of the report.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
272	43718	25	13	33	0	0	This paragraph seems to be a bit inconsistent with NZ having a Coastal Policy Statement 2010, although that does get referred to in Box 25-2. The NZCPS does require consideration of precautionary responses together with a time frame of at least 100 years for SLR. Planning for coastal change is also influenced by the Resource Management Act Section 7(i). However, the following comments on problems in the governance structures do seem to still be very relevant. (Martin Manning, Victoria University of Wellington)	We don't see an inconsistency here, since the NZCPS is about strategic directions for managing risks and is cited here (Minister of Conservation 2010), but it has not undertaken a risk assessment itself nor is there a cross-sectoral policy framework to assess of manage climate change related risks. Added "cross-sectoral" before 'adaptation policy framework' to make that latter point clearer.
273	49330	25	13	33	0	0	This is a very important point. The Australian Treasury have discussed targets, but by and large these are not based on rigorous assessment of risk. Indeed risk assessment at the national level is a very complex task that deserves much greater holistic scientific, economic and sociological input. This subject impinges on discussion elsewhere in the document (comment 46 below) about holistic assessment. (Graeme Pearman, Monash University)	We are unsure about this comment. It seems off topic (about mitigation)? And the sentence in question is about NZ but the comment seems about Australia? Wording has been revised to hopefully remove any misunderstanding about the scope of the last two sentences of this para.
274	41486	25	13	37	13	54	This section (or other sections in the chapter) could consider recent flooding in Brisbane 2011 and how such events have impacted on coastal planning in Queensland in particular and in Australia in general. Also, specific legal cases have emerged which would require a mention in regards to sea level rise, refer to BONYHANDY, T., MACINTOSH, A. & MCDONALD, J. (eds.) Adptation to Climate Change: Law and Policy Annendale, The Federation Press. (Johanna Mustelin, Griffith University)	Bonyhady et al is already cited in section (McDonald 2010). We consider that there is insufficient evidence to substantiate why and whether specific recent events in 2011 have resulted in changes to planning approaches, and how durable such changes are, since they are always the result of underlying pressures and responses to specific events.
275	46544	25	13	39	13	42	“The location … this century” stands alone and does not need the ‘inability to rule out’ part. (Neville Smith, Bureau of Meteorology)	Paragraph has been revised to reduce length, reviewer's point has been incorporated in revision.
276	45126	25	13	42	0	0	anticipate new data very shortly, from national scale economic analyses of impacts of 4 hazards on infrastructure (Heinz Schandl et al, CSIRO/DCCEE) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Key information from this work has been included in the box (Baynes et al).
277	49331	25	13	43	0	0	The reviewer is doubtful about the real value of an assessment that does not included the impacts of extreme events. At least this shortcoming should be mentioned. (Graeme Pearman, Monash University)	The DCCEE assessment did include extreme (1% ARI) events in a number of states, hence we consider that citing the figures as benchmarks is appropriate here; they only serve to indicate the scale of impacts.
278	46545	25	13	50	0	0	There are 6 States and 2 Territories in Australia, and States and Territories with coastal exposure. (Neville Smith, Bureau of Meteorology)	We no longer provide a complete enumeration of planning provisions and do not give specific numbers, given the change in regulations during the time this chapter is being drafted.
279	41124	25	13	50	13	51	Victorian planning benchmarks have recently changed to 0.2m by 2040 (no longer 0.8m by 2100). http://www.premier.vic.gov.au/media-centre/media-releases/4099-coastal-planning-thats-commonsense.html (Colette Mortreux, University of Melbourne)	The revised text no longer gives specific numbers and instead highlights the the dynamic (and politics-driven) nature of planning benchmarks.
280	42565	25	13	50	13	54	Regarding mandatory planning benchmarks by 2100 (last para, pg 13). There has been a recent change in Victoria to have an intermediate level of .2. (Lisa Cowan, Department of Primary Industries)	The revised text no longer gives specific numbers and instead highlights the the dynamic (and politics-driven) nature of planning benchmarks.
281	42566	25	13	50	13	54	http://en.occa.mard.gov.vn/Crawl-Content/Planning-laws-eased-to-recognise-incremental-sea-level-rise-ABC-Online/2012/6/7/72011.news (Lisa Cowan, Department of Primary Industries)	The revised text no longer gives specific numbers and instead highlights the the dynamic (and politics-driven) nature of planning benchmarks.
282	45127	25	13	51	0	0	Note that VIC has updated their benchmarks recently; QLD likely to (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	The revised text no longer gives specific numbers and instead highlights the the dynamic (and politics-driven) nature of planning benchmarks.
283	41223	25	13	51	13	51	Sea level rise in Victoria recently revised downwards to 0.4 and NSW under review as part of vreview of whole planning system - reference: A new planning system for NSW: Green Paper (Barbara Norman, University of Canberra)	The revised text no longer gives specific numbers and instead highlights the the dynamic (and politics-driven) nature of planning benchmarks.
284	41224	25	13	52	13	52	although local councils retain flexibility for their implementation'- actually they generally do not legally have flexibilty but compliance and implementation is more the issue which is then resolved throughthe admininsitrative appeals systems as a default decision making process - suggest modified wording to reflect this (Barbara Norman, University of Canberra)	Wording revised consistent with this suggestion.
285	48701	25	14	1	14	2	To align closer to the text of (MfE 2008a), "2090s, but considering .." should be replaced by "2090s, and at least considering .." (Robert Bell, NIWA)	Wording modified accordingly.
286	36434	25	14	5	0	0	so what does it encourage if not protection (see line 25). The big issue re sea level rise that seems not to be here is increased storminess (incidence of powerful storms on coastlines) (Eric Pawson, University of Canterbury)	Wording revised, but we do not have the space to elaborate on the range of response options covered by protection, accommodation and retreat here, and we consider that the box as a whole sufficiently canvasses these issues. The claimed increase in storminess as main driver of future impacts is not substantiated by the literature, as underlying sea level rise dominates the change in coastal risks (even if individual events are generally associated with storms).

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
287	48702	25	14	5	14	6	The NZCPS extends further than assessing hazard risks and also mandates different approaches for existing and new development. So sentence should read "..assessing hazard risks (including the effects of climate change) and in response to the increasing risks, discourages protection of existing development as the default response and risk avoidance for new development." Latter is derived from Objective 5 and Policy 25 of NZCPS. (Robert Bell, NIWA)	Not clear that this longer text is necessary, it still seems consistent with saying that protection is not the default response. Wording revised to hopefully address the reviewer's concerns without using quite as many words.
288	49802	25	14	10	14	10	After 'based on a diversity of approaches' you may wish to insert a reference. The reference mentioned in the previous comment, White, N. E. (2009). Local Government Planning Responses to the Physical Impacts of Climate Change in New South Wales, Australia. International Journal of Climate Change Impacts and Responses, 1(2), 1-16. , discusses the diversity of approaches that local government in NSW has employed to attempt to incorporate cc adaptation planning. These include (from page 10 of the article) Collaborated with other council(s) Prepared report(s), Created new task(s) within existing role(s), Conducted risk assessment(s), Developed policy, Created new role(s) within council, Developed management plan(s), Altered Environmental Planning Instrument(s) and/or other planning policy (Nadine Elizabeth White, Southern Cross University)	The intent of this sentence is more specific to spatial planning responses to sea level rise, rather than generic approaches for engaging with climate change in planning. Hence we did not add the reference here, but included it in the broader discussion of constraints and enabling factors for local government.
289	45128	25	14	11	0	0	There are also often contested values and even contested legitimacy fo the instituions expected to resolve those values - see Gorrdard et al (in press - already cited in the chapter). (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Useful point, Gorrdard et al reference inserted with accompanying wording.
290	48937	25	14	16	25	42	require effective co-ordination (line 16), divergent priorities at different levels of gov't (29/30), multiple competing interests (41/42) - collectively suggest the need for greater co-ordination across whole-of-government (ie both inter-governmental & inter-departmental). The need for such co-ordination might also be usefully highlighted in section 25.9 (ie the section on future needs, gaps etc) with appropriate re-badging of the title (Leon Soste, Department of Primary Industries, Victoria, Australia)	This is less a research gap than an implementation gap and risks becoming policy-prescriptive for the section on key knowledge gaps. No change made.
291	41225	25	14	17	14	17	innovative regional responses to climate change: Norman, B, & Nakanishi, H, 2011, Planning for extreme weather events and climate change: innovative regional planning responses in Australia, Asian Planning Schools Association, Tokyo, September 2011; Gurran, N, Hamin, E, Norman, B 2012, 'Climate change mitigation, adaptation and local planning' in Gurran, N Australian Urban land Use Planning: Principles and Practice, Sydney University Press, Sydney, pp. 241-254; Norman, B & Steffen, W, 2010, Canberra Urban and Regional Futures: an innovative response to regional resilience- World Congress ICLE, Bonn; Norman, B, 2009, 'Principles for an intergovernmental agreement for coastal planning and climate change in Australia', Habitat International 33, pp 293-299, Elsevier, the Netherlands. (Barbara Norman, University of Canberra)	The citations and indeed the whole sentence is only intended as an example of regional planning responses, not as a complete enumeration of existing studies. No change made.
292	41226	25	14	27	14	27	Refer to recent report for the national Coasts and Climate Change Council - Coastal climate change risk - leagl and policy reponses in Australia; also recent advice to Federal Minster by the Council - http://www.climatechange.gov.au/climate-change/australias-coasts-and-climate-change/adapting/coasts-and-climate-change-council/summary-council-recs-to-government.aspx (Barbara Norman, University of Canberra)	We consider that the Gibbs and Hill report sufficiently and in more detail covers these issues, and with less policy-prescriptiveness.
293	42524	25	14	40	14	40	There are 4 reports that underpin the review of drought policy: economic, social, climatic and WA drought pilot. See http://www.daff.gov.au/agriculture-food/drought/national_review_of_drought_policy. Another good example of policy initiatives that have strong links to reducing vulnerability to climate change is VBRC (2010) which had 67 recommendations. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Given space constraints we don't feel it is necessary to cite all four parts of the review here; the Productivity Commission contribution strikes us as the most relevant for this context. The VBRC report has been included, thanks.
294	45129	25	14	42	0	0	they also demonstrate the potential slow nature of policy responses even where apparently obvious - the PC 2009 report in to drought policy cited here as if it was the trigger to exceptional circumstances changes had materially similar recommendations to those of the national Drought Policy Review in 1990. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Good point; wording modified in following sentence to highlight implementation lags and windows of opportunity related to policy implementation.
295	49332	25	14	44	0	49	This is a place where the issue of holism could be enhanced. It is about how do we bring together multiple strands of expertise on the one hand and how do we target multiple outcomes on the other. (Graeme Pearman, Monash University)	This comment appears to be more about a research and implementation need than an assessment of current knowledge. Added wording to highlight link between private sector and holistic societal outcomes.
296	41478	25	14	44	14	45	"The private sector and individuals are also important adaptation actors (AR5 WGII Chap 16), but evidence of their drivers, constraints and processes is limited." This needs further clarification as there is a large number of studies since AR4 indicating the kinds of drivers, constraints and processes individuals are impacted by and part of when it comes to adaptation. This argument might be valid for private sector as there has been less focus on it although recent projects, such as the Climate in the Boardroom, are worth investigating on this matter. However, the psychology literature in particular and social science studies provide increasing evidence how individuals adapt to climate change. (Johanna Mustelin, Griffith University)	The role of individual adaptations and perceptions of risk is taken up in a new section 25.4.3 on socio-cultural dimensions of impacts and adaptation options. Wording on organisational responses has been revised to include preliminary findings from the Climate in the Boardroom project.
297	42703	25	14	45	0	0	The report What Matters to Australians: Our Social, Political and Economic Values 2012 by Timothy Devinney, Pat Auger, Rosalind DeSailly provides an overview of what individuals think about climate change/societal values to climate change. This is also relevant to section 25.5.5 p 16 line 12. The report is available at http://www.modern-cynic.org/SEV_Reports/AustralianReport(31March2012).pdf (Marie Keatley, University of Melbourne)	This report was considered along other relevant material in the new dedicated section 25.4.3 on individual perceptions and responses to climate related risks.
298	37494	25	14	45	14	45	Remove comma after Gardner et al. (2010) (Will Steffen, The Australian National University)	Wording revised, no longer relevant.
299	42525	25	14	45	14	45	IPCC style normally puts the reference(s) at the end of the sentence, rather than at the front. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Wording revised, no longer relevant.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
300	45130	25	14	49	0	0	Here and elsewhere I strongly recommend only citing the final PC 2012 report as the draft report has been widely challenged (see submissions) and change is likely in their Final Report (due Sept 2012) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	The citation has been removed here since additional reports specific to private sectors have become available since the last draft version. This was only a placeholder forthe final report, which will be assessed for its content before citing it, subject to its timely release for our final draft.
301	41479	25	15	3	15	7	How are these constraints different to what has been mentioned in ch 16? Also, consistency in terminology: line 4 uses 'barriers' whereas the AR5 uses 'constraints'. The question for this section 25.5.2. is what makes these constraints specific for Australiasia? Now the section comes across as describing generic constraints but with Australia-focused references. (Johanna Mustelin, Griffith University)	Barriers' has been corrected to 'constraints'. We are not arguing that there are different or place-specific constraints, we simply provide place-based evidence that actually confirms the typology from chapter 16 and populates it with region-specific examples. This is now stated explicitly. The literature provides no evidence that there are any notable Australasia-specific constraints, though the relative importance of specific barriers as demonstrated in the new table 25-2 is no doubt region-specific.
302	39073	25	15	6	15	7	reference is made to "small and fragmented industries". Some acknowledgement that small and medium enterprises are understood to be vulnerable to climate and weather induced impacts both from a business point of view as well as from their socio-economic situation, where they are likely to be "hit twice" as amember of the local community. See Murta, J., Gero, A., Kuruppu, N. & Mukheibir, P. 2012, 'Enhancing adaptive capacity of small to medium enterprises - Background Report', Institute for Sustainable Futures, University of Technology Sydney, Sydney, Australia, pp. 1-43) (Pierre Mukheibir, University of Technology Sydney)	This statement does not seem to be generically true (there may equally be SMEs that benefit from climate change or are not directly affected), nor would such a double-hit where it exists be particular to SMEs as larger industries are exposed to other global changes (e.g. in global markets and prices). No change made here, but the report is now cited in the preceding section as evidence for the diverse range of responses and preparedness of business and how this depends on their size and exposure.
303	49333	25	15	9	0	25	Here is another example of where the hard to read text might be better replaced by a tabulation that lists factors, level of confidence, and citations in tabular form. Worth considering. It might also be worth mentioning here the relevance of this to the issue of setting global emission targets. (Graeme Pearman, Monash University)	Suggestion has been followed and we now summarise constraints and enabling factors in a separate table. We do not consider that there is sufficient evidence from the literature on constraints to make a direct link to mitigation targets, but the general tendency for the need for more transformative adaptation for higher levels of warming (and the difficulties with enabling such transformative changes) is taken up in the synthesis section of this chapter.
304	48700	25	15	11	15	16	The external peer-reviewed guidance report for local government Pathways to Change by Brriton et al. (2011) would be a useful reference to add to the other Refs for this summary sentence about institutional challenges to implementing adaptation. It provides guidance to councils on surmounting barriers in a re-iterative 4-step process: awareness & acceptance, assessment, palnning a way forward, implementation, monitoring & review Full citation: Britton, R.; Dahm, J.; Rouse, H.; Bell, R.; Blackett, P. 2011: Coastal adaptation to climate change: Pathways to change. Externally peer-reviewed report prepared as part of the Coastal adaptation to climate change, NIWA publication. 106 p. (Robert Bell, NIWA)	This report seems less relevant here on constraints but is now cited further below with regard to adaptation decision-making frameworks and enabling factors.
305	45131	25	15	15	0	0	This citation of PC 2012 is likely to still be correct in their final report (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Wording revised and citation shifted to new table in appropriate place.
306	49804	25	15	16	15	18	Again, my PhD findings also support this assertion however I am not sure when the papers I am writing will be published. (Nadine Elizabeth White, Southern Cross University)	Thank you, we feel the cited papers sufficiently substantiate the point and the confidence rating we give this.
307	49803	25	15	23	15	25	My PhD findings also support this assertion however I am not sure when the papers I am writing will be published. (Nadine Elizabeth White, Southern Cross University)	Thank you, we feel the cited papers sufficiently substantiate the point and the confidence rating we give this.
308	36435	25	15	32	0	0	what is missing is roadmaps such as that provided for the EU by the EU Commission, giving targets and actions through to 2050. Where these are available, they are vague, such as the Christchurch City Coucnil Climate Smart Strategy, 2010. However the earthquakes provide an opportunity to revisit this and build a more resilient city. There is no recognition of the earthquakes and such opportunity in the chapter. (Eric Pawson, University of Canterbury)	It is not clear whether the Christchurch re-build will actually deliver a more climate-resilient city, given the noted vagueness of the 2010 strategy. The revised text earlier on now notes the window of opportunity that a crisis can represent (but the box on insurance also notes the potential maladaptive outcome from rapid re-building after a disaster). There is no literature on improving climate resilience through major rebuilding programmes, given the rarity of earthquakes (and relying on earthquakes to achieve improvements does not appear an effective strategy).
309	46546	25	15	35	15	37	The Productivity Commission (2012) went further and suggested climate variability pressures take precedence over climate change pressures. Change “near-term non-climate pressures” to “near-term non-climate change pressures”. (Neville Smith, Bureau of Meteorology)	Ok, change made.
310	42567	25	15	35	15	43	There may be the potential to link the changes in Victorian planning to include an intermediate benchmark of .2 to what you are talking about here. (Lisa Cowan, Department of Primary Industries)	The issue of changing planning benchmarks is now taken up more explicitly in the coastal box, and we feel the general issue is sufficiently captured under the rubric of "political leadership and short election cycles" in the new table.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
311	49334	25	15	39	0	0	"reword "high-level identification of sectors and locations at risk". (Graeme Pearman, Monash University)	Reworded.
312	42526	25	15	40	15	40	A good example is early warning systems for heatwaves (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Correct, even though it is only one example. Wording revised to capture both strategic long-term and near-term responses such as early warning systems.
313	46547	25	15	41	0	0	Reference Hennessy et al 2007 specifically (Neville Smith, Bureau of Meteorology)	We now provided a substantially expanded list of references but don't feel that reference to Hennessy et al (2007) is appropriate here since that was an assessment rather than a guidance document.
314	41480	25	15	47	15	50	The meaning of participatory processes for adaptation policy is complicated by the fact that currently there is a lack of evaluation mechanisms to provide robust understanding how participatory processes can contribute to 'better' or more robust policy. In addition, in Australia, public participation in adaptation policy processes is uneven and differs between levels of governments, while there is also a high reliance on assumed willingness of the public to participate in adaptation. Suggested reference BURTON, P. & MUSTELIN, J. 2011. Planning for unavoidable climate change: is public participation the key to success? Submitted to Urban Policy and Research or Burton, P. and Mustelin, J. Planning for unavoidable climate change: is public participation the key to success? State of Australian Cities (SOAC) 29.11.-1.12.2011. Melbourne (Johanna Mustelin, Griffith University)	This is an important point and has been reflected in a substantially re-written paragraph on participatory processes.
315	45132	25	15	49	0	0	Participatory processes...robust scientific information - could cite Gardner et al 2009 here (Gardner, J., Dowd, A.-M., Mason, C., and Ashworth, P. (2009). A framework for stakeholder engagement on climate adaptation. CSIRO Climate Adaptation Flagship Working paper No. 3. CSIRO Climate Adaptation Flagship, Canberra. (http://www.csiro.au/resources/CAF-working-papers.html) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Thanks, yes useful citation particular regarding specific challenges; included in revised text.
316	39074	25	16	1	0	0	Recent planning by the Melbourne water utilities has shown that applying a flexible approach with diversified portfolios of options provides a more resilient system for dealing with uncertainty.By adopting a proactive strategy that firstly considers incremetal capital options such as small scale decentralised non-potable solutions before introducing large scale potable supply options, the water supply system was bette able to cope with more extreme circumstances and absorbed future shocks. Under future water constrained environment, this adaptive strategy was cheaper than the usual deterministic approaches. However, under milder scenarios, this insurance type approach comes at an increased cost (see Mukheibir, P., Mitchell, C.A., McKibbin, J.L., Komatsu, R., Ryan, H. & Fitzgerald, C. 2012, 'Adaptive planning for resilient urban water systems under an uncertain future', OzWater'12 'Sharing Knowledge, Planning the Future', Sydney, Australia, May 2012 in Proceedings of OzWater'12 'Sharing Knowledge, Planning the Future', ed Australian Water Association (AWA), Australian Water Association (AWA), Sydney, Australia). (Pierre Mukheibir, University of Technology Sydney)	Noted, but we feel that the points are already covered sufficiently, with references to the Melbourne Water publications, in Box 25-2. Space limitations prohibit us from repeating these aspects here in this more general discussion.
317	49336	25	16	1	16	4	Why is "real options" in inverted commas? And "Mainstream" in Line 4? (Graeme Pearman, Monash University)	Reference to real options has been deleted, and inverted commas deleted from mainstreaming since this is covered in the glossary.
318	49335	25	16	1	16	54	Here is where it might be worth discussing the resilience approach and such work in Australasia. (Graeme Pearman, Monash University)	We have not found a sufficient body of literature on a resilience approach in the context of climate change that would justify a substantive discussion and that would add value beyond what is already stated.
319	41125	25	16	2	16	3	Consider including O'Neill and Handmer (2012) Responding to bushfire risk: the need for transformative adaptation. Environmental Research Letters, 7(1). (Colette Mortreux, University of Melbourne)	This is cited in the fire box; we consider the existing references to sufficiently support the more general points being made here.
320	45133	25	16	6	0	0	Thisis a case where the PC 2012 draft has been quite weak, but the Final report may be stronger... The CSIRO 2012 submission to their draft report is also stronger on this point, but possibly not the sort of primary source to be used in IPCC. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	The reference here is only intended to flag that at least, the government recognises the need to ask the question whether there are systematic barriers that need addressing. The answer to that question as contained in the Productivity Commission report is a separate issue that is re-visited in the synthesis for this chapter. The final draft will re-consider citations of the report depending on the contents of the final report once it is released.
321	46548	25	16	9	0	0	WG II may need to consider the definition of adaptation limit, limit to adaptation, limitations to adaptation etc (refer Chapter 16). "xxxx limit" would normally refer to a limit of xxxx (the line beyond which xxxx cannot/may not proceed). The Chapter 16 definition is consistent with this interpretation. But Chapter 16 (and this Chapter) then user 'limit to adaptation' and 'adaptation limit' interchangeably, which does not seem right. "limit of adaptation" OK. "limit(s) to" and "limitation(s) to" would seem to be the same thing – elements that constrain adaptation. (Neville Smith, Bureau of Meteorology)	Wording revised to consistently say "adaptation limit" or "limit of adaptation" (and text shifted and merged into conclusions section).
322	46549	25	16	12	16	13	The word "impossible" does not appear in the definition "A situation in which an actor's objectives and values can no longer be secured from unacceptable risks through adaptive action, or where ..."; "no longer secured from unacceptable risks" is the key element and this does not equate to impossible. (Neville Smith, Bureau of Meteorology)	Sentence removed due to space constraints and replaced with cross-reference to chapter 16 (and text shifted and merged into conclusions section).
323	45134	25	16	21	0	0	add Park et al 2012 to Howden ref (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Done (and text shifted and merged into conclusions section).
324	45135	25	16	27	0	0	could cite Park et al 2012 for this. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Yes, done (and text shifted and merged into conclusions section).

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
325	53575	25	16	32	0	0	Please ensure consistency with WGI, the adaptation chapters, and with relevant sectoral chapters. (Kristie L. Ebi, IPCC WGII TSU)	Noted, thank you, we tried to ensure consistency with other chapters to the extent possible while all chapters are still undergoing significant revisions.
326	42527	25	16	32	16	32	General comment about format: some sections have a section of observed impacts followed by a section on projected impacts, but it's not consistent. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Noted; we didn't include sub-section headings where the sub-section effectively consists of only one sentence, but all sections strive to follow the same overall logical flow.
327	41506	25	16	34	17	30	Two isues which seem to be missing are: (i) Implications of observed and predicted changes in glaciers and seasonal snow on water resources, and (ii) Implications of climate change for water quality. I can't suggest particular references. Clive Howard-Williams from NIWA Christchurch could advise you on the best person to ask for references on this. (David Wratt, NIWA, New Zealand)	The changes in precipitation phase (precipitation falling more as rainfall and snow melting earlier) is discussed in the third paragraph of 25.5.1 and also in 25.7.4 (energy supply). The glacier impact on water resources is relatively small compared with the much bigger precipitation contribution to catchment inflows and the large uncertainty in future rainfall (and therefore runoff) projections. There is little literature on the change in water quality impacting on water as a resource, and this is probably small compared to the change (and uncertainty in the change) in quantity.
328	41505	25	16	34	18	48	The section on freshwater resources focuses mainly on Australia. This may reflect the availability of published information, however impacts of climate change on water resources are important for NZ too. I suggest you consider bringing a NZ person familiar with freshwater changes and impacts on board as a Contributing Author, to ensure relevant NZ material is captured. (David Wratt, NIWA, New Zealand)	About two-thirds to three-quarters of the section focuses on Australia, reflecting the availability of published information. New Zealand is covered in some detail (particularly in the third paragraph in 25.5.1) with help from hydrologists from New Zealand. The paragraph has also been revised and expanded slightly to build on the rainfall projections in Section 25.2.
329	46550	25	16	44	0	0	Use ‘estimated changes’ rather than ‘projected changes since the method uses a hydrological model for a specific horizon, cf the projections of precipitation (25.3.3). (Neville Smith, Bureau of Meteorology)	Agreed, 'estimated changes' is now used.
330	42528	25	16	46	16	46	replace "current models" with "CMIP3 models" (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Agreed. Text now refers to CMIP3 models.
331	51517	25	16	49	16	50	For the described amplification, it would be helpful to clarify the relevant metrics being compared--percentage increase in precipitation versus percentage increase in stream flow, or different units for measures of precipitation and streamflow? (Katharine Mach, IPCC WGII TSU)	Agreed. It is percentage change, which is now stated in the text.
332	46551	25	16	51	0	0	Use “vary over time” cf “change over time” since the latter might be interpreted as representing a trend. (Neville Smith, Bureau of Meteorology)	Agreed. 'Vary over time' now used.
333	46552	25	17	7	17	12	Fig 25-3 caption: CMIP3 models rather than AR4 GCMs (AR4 does not have models) (Neville Smith, Bureau of Meteorology)	Agreed. Caption now refers to CMIP3 models.
334	42529	25	17	18	17	18	Some readers won't understand "to the phase of precipitation" so consider re-phrasing as "from snow to rain" (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Reworded and 'phase of precipitation' no longer used.
335	42704	25	17	31	0	0	typographical error: 25.6.2.2. Adaptation should be 25.6.1.2 (Marie Keatley, University of Melbourne)	This is now correct. There is also a slight change in the structure of Chapter 25 in the SOD.
336	38657	25	17	34	17	34	Be specific about the "recent drought" - when and where. (Janice Lough, Australian Institute of Marine Science)	Agree. The 1997-2009 Millennium Drought in south-eastern Australia is spelled out in the text.
337	42530	25	17	34	17	34	replace "recent" with "1997-2009" (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Agree. The 1997-2009 Millennium Drought in south-eastern Australia is spelled out in the text.
338	45136	25	17	40	0	0	'no explicit management changes' seems to be contradicted by p18:26-44 (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	The statement here refers to New Zealand, while page 18 discusses Australian examples, so no change made at this stage. We will consider clarifying explicitly that this sentence again refers only to NZ in the final government draft.
339	42531	25	17	49	17	49	replace "15 years to 2010" with "13 years from 1997-2009" (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Agree. The 1997-2009 Millennium Drought in south-eastern Australia is spelled out in the text.
340	49337	25	17	51	0	0	It could be useful to explicitly show how DSE have adopted the scientific findings from the SEACI program into real strategic planning/adaptation. (Graeme Pearman, Monash University)	Box 25.2 now also refers to DSE and others developing water resources strategies to cope with prolonged drought and climate change.
341	49341	25	18	1	0	54	There should be a clear statement of how much urban and rural water use contributes to demand in Australia as this is an important factor in available adaptive responses. (Graeme Pearman, Monash University)	Across Australia, about 70% of water is used in rural areas and 30% in urban areas. However, this is different in different regions, for example, more than 90% is used for irrigation in the Murray-Darling Basin. Quoting these numbers is not necessary for this chapter, and can be confusing/misleading without an explanation of the regional context.
342	49338	25	18	2	0	0	Suggest “Water Commissions in 2004 and the Murray-Darling Basin Authority in 2008, were…”. (Graeme Pearman, Monash University)	We consider that the sentence is clear without the comma.
343	49339	25	18	11	0	0	Here is the first incorrect unit for giga. Should be G. (Graeme Pearman, Monash University)	Agree. GL is now used throughout.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
344	42268	25	18	11	0	11	2750 gL: Presumably this needs a time dimension. Is it per year? (Adolf Stroombergen, Infometrics)	Agree. Test now states GL/year.
345	46553	25	18	19	18	21	This strong finding is not as clear in the ES (p 4) (Neville Smith, Bureau of Meteorology)	This issue is in fact reflected as a key risk in the executive summary, though with a stronger emphasis on food production since the risk to montane ecosystems is also captured separately (which arises not just from drying but also temperature extremes and loss of snow cover).
346	45137	25	18	21	0	0	meaning not clear - is this "even if comprehensive adaptation is achieved"? (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	We feel the wording is as clear as possible, i.e. adaptation that consists of a comprehensive portfolio of measures.
347	49340	25	18	23	0	0	Say what cities. (Graeme Pearman, Monash University)	The paragraph as a whole explicitly refers to several cities and gives examples.
348	42705	25	18	26	18	28	Currently sewerage recycling is not used for potable purposes and there are few examples of stormwater, the current wording could be interpreted as both these being used for potable purposes hence suggest adding “for non potable purposes”: like sewage recycling and stormwater (for non potable purposes), programs to reduce demand. (Marie Keatley, University of Melbourne)	Agree. Text now states that water reuse is for non-potable purposes.
349	36436	25	18	37	0	0	a key issue here is the shift to local native species that are adapted to environment, rather than the Anglicised landscapes of central Melbourne's parks, for example. (Eric Pawson, University of Canterbury)	This is one of many possible options for using less water but there is too few examples or evidence of this being done to include in the text, and the water use by public parks is not the dominant driver of urban consumption.
350	46554	25	18	42	0	0	“an effective risk treatment” is better than “a positive outcome” (Neville Smith, Bureau of Meteorology)	Agree. 'useful strategy' is now used instead of 'positive outcome'.
351	49342	25	18	44	0	0	Suggest “respond to changed conditions and attitudes, needs further research”. (Graeme Pearman, Monash University)	Agree. 'needs further research' now used instead of 'remains an open question'.
352	37495	25	18	44	18	44	Remove comma after "drivers and societal attitudes" (Will Steffen, The Australian National University)	Agree. Comma removed.
353	45138	25	18	51	0	0	The title is a little confusing 'terrestrial and inland' - could it be better worded - even reversing it would be clearer - inland water and terrestrial ecosystems?? (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Order has been reversed as suggested
354	45139	25	18	51	0	0	Two major sets of forthcoming reports should be accessible imminently for this section 25.6.2 - Dunlop et al 2012 and Williams et al (2012) - the syntheses summarise several technical volumnes in both cases: (Dunlop M., Hilbert D.W., Ferrier S., House A., Liedloff A., Prober S.M., Smyth A., Martin T.G., Harwood T., Williams K.J., Fletcher C., and Murphy H. (2012) The Implications of Climate Change for Biodiversity Conservation and the National Reserve System: Final Synthesis. A report prepared for the Department of Sustainability, Environment, Water, Population and Communities, and the Department of Climate Change and Energy Efficiency. CSIRO Climate Adaptation Flagship, Canberra.) AND Williams, K.J., Dunlop, M., Bustamante, R.H., Murphy, H., Ferrier, S., Wise, R.M., Liedloff, A., Skewes, T., Harwood, T., Kroon, F., Williams, R.J., Joehnk, K., Crimp, S., Stafford Smith, M., James, C. and Booth, T. (2011) Queensland’s biodiversity under climate change: impacts and adaptation – synthesis report. A Report Prepared for the Queensland Government, Brisbane. CSIRO Climate Adaptation Flagship, Canberra. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Both reports have now been cited
355	42299	25	18	51	19	11	All this is true in my opinion, but the linking logic to impacts is missing. So not a single instance in NZ can link the putative incresed stress of our ecosystems to direct evidence that this will exacerbate CC impacts, or make adaptation more difficult, expensive or slower. I urge some sentences at the back end of this section to make the probable link (medium confidence?) that these changes will be important, but stress that their link to heightened impacts and more difficult adaptation are as yet undemonstrated. (Henrik Moller, University of Otago)	This opening paragraph has been shortened to save space, and the opening sentences of subsequent sections make exactly those points. The opening paragraph of 25.6.1.2 reads: "There is high confidence that existing environmental stresses will interact with, and in many cases be exacerbated by, shifts in mean climatic conditions and any future increase in the frequency or intensity of extreme events, especially fire, drought and floods (Steffen et al. 2009, Bradstock 2010, Murphy et al. 2012)." The opening of section 25.6.1.3 reads: "High levels of endemism in both countries (Lindenmayer 2007, Lundquist et al. 2011) are associated with narrow geographic ranges and associated climatic vulnerability, although there is greater scope for adaptive dispersal to higher elevations in New Zealand than in Australia."
356	49343	25	19	1	19	11	This is very qualitative. Line 9. Remove extra parenthesis before Ling. Is it worth having some general text that deals with the complexity of operating ecosystems, the difficulty of detecting whole system changes and the dependence on observing individual species as poor indicators of whole system dynamics? (Graeme Pearman, Monash University)	This opening paragraph has been shortened to save space, but we feel the qualitative context is important to appreciate the multiple stresses that ecosystems are under.
357	36437	25	19	8	0	0	clearance of native vegetation in NZ. This is a highly debatable statement, especially as it conflicts with comments about the move away from plantation forestry on p 23, line 18. In some regions, loss of native vegetation continues; in some the reverse is true; in many riparian replanting schemes have added consdierably to native vegetation. Reforestation is occuring all over NZ in wetter regions: see M Winterbourn et al, The Natural History of Canterbury, Canterbury U Press, 2008 for examples: notably Hugh Wilson's chapter on Banks Peninsula. (Eric Pawson, University of Canterbury)	The statements about vegetation clearance have been removed for space reasons.
358	38266	25	19	9	19	9	I don't understand the meaning of the word “abtraction” in that context. (Guillaume Simioni, INRA)	"Abstraction" has been replaced with "over-allocation"

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359	42532	25	19	18	19	19	replace "fire" with "fire management". Replace "ongoing drought" with "1997-2009 drought" (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Changes made as suggested, though "fire" has been changed to "fire regimes and their management"
360	41663	25	19	19	19	21	Lacking confidence statements in detection and attribution (Lourdes Tibig, The Manila Observatory)	There are already two confidence statements in the paragraph and we consider more to be unecessary and unjustified.
361	38658	25	19	19	19	23	Various papers relating to freshwater ecosystems may be relevant here in special issue of Marine and Freshwater Research Volume 62 Number 9 "Climate change and Australian Aquatic Environments, Fish and Fisheries". (Janice Lough, Australian Institute of Marine Science)	Several references from this volume have now been cited in sections 25.6.1 and 25.6.2.
362	41664	25	19	19	19	23	Only the ongoing drought? If so, then this is not observed impact of climate change (Lourdes Tibig, The Manila Observatory)	The wording has been clarified to indicate that a sepcific drought period (1997-2009) is being referred to.
363	48039	25	19	22	0	0	would be worth mentioning that high natural variabiliity in Australia's freshwater ecosystems makes it very difficult to detect climate change signals (e.g. see Booth et al 2011 for a discussion). Booth, D. J., N. R. Bond, and P. Macreadie. 2011. Detecting range shifts among Australian fishes in response to climate change. Marine and Freshwater Research 62:1027–1042. (Nick Bond, Griffith University)	This is a good point. The phrase "...and natural climate variability " has been added to the relevant sentence.
364	41665	25	19	23	19	26	Which are the few impacts in New Zealand directly attributed to climate change rather than variability, considering that the only one cited is that the alpine treelines in New Zealand remains stable. (Lourdes Tibig, The Manila Observatory)	The phrase has now been changed to "few if any...".
365	49344	25	19	26	0	0	Surprised that no mention is made of observed genetic impacts. (Graeme Pearman, Monash University)	The main studies on observed genetic impacts were published prior to 2007 and were cited in the AR4. As far as we are aware there are no more recent papers than those cited in the AR4, but we will keep checking until the last minute.
366	42533	25	19	26	19	26	mention NZ glacier retreat? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This section is about biological impacts. Details of observed physical impacts on NZ glaciers are in Section 25.2 / Table 25-1.
367	46555	25	19	30	0	0	As noted in the specific comments against the table, I think the authors are treading an unhelpful path. The box does not cover evidence of a changing climate in natural and managed ecosystems, but rather (a) looks at evidence of change in ecosystems on long (climate) time-scales, and (b) whether the evidence is sufficient to show there is a relationship with climate. It does provide multiple lines of evidence that these system changes may be in response to climate, but less evidence that they could be used as a proxy for monitoring the climate system. “Evidence of the influence of climate in ecosystems” is actually what the table is about. It is not helpful that the terminology is not consistent with that used in Chapter 18. (Neville Smith, Bureau of Meteorology)	We feel the reviewer has misunderstood the purpose of the table. The table is indeed a list of examples in which a biological change detected over the past few decades is consistent with having been partially or wholly casused by recent climate change. The introductory para above the table now reads: "Observed changes in species, natural and managed ecosystems (25.6.1, 25.6.2, 25.7.2) provide multiple lines of evidence of biological impacts of a changing climate". (see further elaboration of this in response to comments 662 and 663).
368	53576	25	19	30	19	42	Please ensure consistency with the glossary. (Kristie L. Ebi, IPCC WGII TSU)	Advice noted and followed to the extent possible while all chapters are still undergoing parallel revisions for the SOD.
369	42706	25	19	34	0	0	naming the study would help the reader in the sentence "At present only one study describes a climate-related change in a managed ecosystem" (Marie Keatley, University of Melbourne)	The reference (Webb et al 2012) has now been added to the paragraph that introduces the table.
370	49345	25	19	35	0	0	Why not “factors” not “drivers”? (Graeme Pearman, Monash University)	Our judgement is that these terms are largely interchangeable here.
371	49346	25	20	2	0	0	Evidence to this statement? (Graeme Pearman, Monash University)	This opening statement has been removed to save space.
372	46556	25	20	6	0	0	Not always increased: … and changes in frequency … (Neville Smith, Bureau of Meteorology)	The following qualifier was intended to be inserted but was missed in the SOD: "and any future increase in the frequency or intensity of extreme events". This will be included in the final government draft.
373	45140	25	20	7	0	0	Note also Dunlop and Brown 2008, and Dunlop et al 2012 forthcoming (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	This report has now been cited
374	46557	25	20	7	20	14	The authors are trying to draw an inference between impacts observed in drought and heatwaves, and the projected increase in heat waves (25.3.1-2) and changes in precipitation (25.3.3, 25.3.5). North eastern Australia is not projected to have reduced water availability. There may be high confidence that heat combined with water shortage has a significant impact in natural ecosystems but, as project changes in both heatwaves and water availability are uneven, it is not reasonable to extend this to (implied) future loss and future risk. (Neville Smith, Bureau of Meteorology)	This point is well taken but we realised that it had not been incorporated in the final version of the SOD. This qualification will be included in the final government draft.
375	37496	25	20	12	20	12	Remove comma after "...reduced water availability" (Will Steffen, The Australian National University)	Change made as suggested
376	45141	25	20	16	0	0	New approaches to modelling changing environments are an important advance on individual species modelling - see case studies by Ferrier et al in Dunlop 2012 and Williams et al 2012 (see comment on p.18, section 25.6.2) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	This para is about response of individual species and thus the focus on SDMs is appropraite. The following paragraph is concerned with community and ecosystem level modelling and the Dunlop et al 2012 and Williams et al 2012 references are cited there.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
377	49347	25	20	16	20	24	Remove definition of SDM and spell out in full. This is a very important point as many bureaucracies seem to feel simple mapping of species against climate variables will provide the information they need to anticipate change. This could be expanded. (Graeme Pearman, Monash University)	The acronym SDM is already spelled out at the beginning of the paragraph. There is a specific mention already of the limitations of SDMs and two references are included that detail these limiations. It is our judgement that any expansion of this is unjustified, given space constraints.
378	37497	25	20	17	20	17	"contractions" might be clearer as "range contractions" (Will Steffen, The Australian National University)	Change made as suggested
379	48040	25	20	19	0	0	and fish (Bond, N. R., J. R. Thomson, P. Reich, and J. Stein. 2011. Using species distribution models to infer potential climate change-induced range shifts of freshwater fish in south-eastern Australia. Marine and Freshwater Research 62:1043–1061.) (Nick Bond, Griffith University)	Reference now cited, thank you
380	54950	25	20	22	20	23	Kearney et al. (2010b) is not appropriate reference because it does not integrate mechanistic and demographic models. Appropriate references include Fordham et al. 2012 and Keith et al 2008, both referenced in other chapters. (H. Resit Akcakaya, Stony Brook University)	Correction made. Kearney et al (2010) is referenced in relation to physiological models and Keith et al (2008) in relation to demogrpahic models.
381	42707	25	20	28	20	29	Pickering et al reference is plant focused; inclusion of a fauna reference would strengthened the statement. The current wording leaves the reader with the impression that it is only about loss of snow cover rather than the flow on effects e.g. loss of alpine species and changes in species type and number. (Marie Keatley, University of Melbourne)	Sentence now has the addition: "….from loss of snow cover, with flow on impacts such as exotic species invasions and changed species interactions" (e.g. Pickering et al. 2008)
382	49348	25	20	34	0	0	Should be Pittock et al., 2008. (Graeme Pearman, Monash University)	Correction made in text (correct reference was included in reference list but a formatting error in endnote resulted in the incorrect insertion in the text)
383	42300	25	20	36	20	39	The first sentence here is fundamentally important, but in my view ecologically simplistic. We know that CC are key influences on the abundance of possums (winter rainfall is the key density independent factor); affect masting events of seeds and fruits in forests that lead to rodent and mustelid eruptions and subsequent knock-downs and potential extinctions of some bird species; and that spring rainfall knocks down introduced wasp populations. There is unequivocal evidence that these species are restructuring NZ ecosystems (and possms and ferrets threaten agriculture by spreading bovine tuberculosis). So it is logical that CC impacts will be mediated indirectly through impacts on these biota. The dilemma is that the CC models have not yet been linked to the existing introduced pest models, so crisp predictions of impacts (or lack of them!) are impossible so far - can you perhaps call for them? Also not all parts of NZ ecosystems are under the clamp of introduced speciea in the way implied by the first part of this sentence. Similarly the all encompassing claim about habitat loss trumping any climate change impacts is facile - it's probably true in highly modified production lansdscapes of eastern South Island New zealand, but direct evidence for habitat impacts elswhere is actually limited. And as for the introduced mamalian and wasp pests, any indirect effects of CC on biodiversity via habitat destruction/alteration could happen. Overall I believe that the sections on impacts on terrestrail ecosystems and biodiversity is relatively weak in this AR5 chapter, yet the potential impacts on them were identified as high importance in IR4 (on the basis of general first principles, but with few specific studies). (Henrik Moller, University of Otago)	This point is well taken and we have now identified the lack of knowledge about how climate change will affect exotic species impacts as a key knowledge gap for New Zealand (Section 25.11). It remains the case that there is simply no other New Zealand literature to cite on this topic, other than the ones already included.
384	46558	25	20	38	0	0	“atmospheric change” is part of climate change. (Neville Smith, Bureau of Meteorology)	We disagree. Atmospheric change is a driver of climate change, but not the same thing. The separation of atmospheric and climate change in the sentence was deliberate, due to the fact that rising CO2 levels have direct effects on plants, in addition to impacts via changes in temperature, rainfall etc.
385	42301	25	20	39	20	39	I wonder how there can be claimed high agreement in the "limited evidence but high agreement" judgement. Really few people, all close colleagues, have been involved in this reporting and there is so little evidence that one wonders what they might agree/disagree about. I think the impacts and putative vulnerability of alpine biota asserted by the earlier McGlone (non-peer reviewed) Landcare Research review report is indeed possible, but there is a critical lack of actual study to test the idea. Can you call for such studies in future or are you precluded from recommending research for future in the brief? (Henrik Moller, University of Otago)	The reviewer's point is taken but we stand by the confidence assessment. The conclusions of the two reviews that have been cited are consistent with the literature on climate change impacts on alpine biota in other parts of the world, including Australia. This point does emphasise the general dearth of literature on climate change impacts in New Zealand, a point emphasised in Section 25.11.
386	49349	25	20	46	0	0	Survived. How? (Graeme Pearman, Monash University)	The word has been replaced by "persisted during". As no observations exist from that time we can only note that they did persist but cannot say how.
387	41507	25	20	54	0	0	Add "than in Australia" after "New Zealand". (David Wratt, NIWA, New Zealand)	Change made as suggested
388	49350	25	21	2	0	0	Far more important is the dynamics of whole systems shifts. (Graeme Pearman, Monash University)	Sentence has been expanded: "…..significant local and global losses of species, ecosystem degradation and large scale changes in the structure and composition of ecological communities are anticipated (e.g. Dunlop et al. 2012)."

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
389	45142	25	21	6	0	0	There is rich material for this in in Dunlop 2012 and Williams et al 2012 (see comment on p.18, section 25.6.2). Also this section completely misses the vital issue of changing conservation objectives, probably the greatest pre-requisite adaptation - see these two sources and Prober & Dunlop 2011 (Prober, S. M. and Dunlop, M. (2011). Climate change: a cause for new biodiversity conservation objectives but let's not throw the baby out with the bathwater. Ecological Management and Restoration 12, 2-3.) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Prober and Dunlop (2011) and Dunlop et al (2012) have now been cited and the first sentence of the paragraph now reads: "There is increasing recognition in Australia that rapid climate change has fundamental implications for traditional conservation objectives (e.g. Steffen et al. 2009, Prober and Dunlop 2011, Dunlop et al. 2012)" . We agree with the reviewer that there is a great deal of material in these and other references that is highly relevant to the section but are unable to include any more detail due to space restrictions.
390	49351	25	21	6	21	22	This is another area where a tabulation of a lot of examples might provide an easier read. (Graeme Pearman, Monash University)	Unfortunately space constraints mean that a table is not justified. Efforts have been made to reduce and simplify the paragaph as much as possible.
391	37498	25	21	7	21	7	Remove comma after "environmental stresses" (Will Steffen, The Australian National University)	Sentence has been removed during revision
392	49352	25	21	16	0	0	Spell NRM out in full. (Graeme Pearman, Monash University)	This acronym is spelt out earlier in the paragraph.
393	43050	25	21	34	23	12	Section 25.6.3 is limited, in consideration of both the ecosystems/organisms impacted by climate change & geographical extent (this section is heavily focussed on Australia, with little mention of New Zealand). Areas where additional information could be provided include :- a) southward extension of the EAC, with a SST increase at four times the rate of the global average, causing major change ("tropicalisation/oligotrophication") of coastal, shelf & open ocean ecosystems (Johnson et al, 2011, JEMBE, 400:17-32; Suther et al, 2001, DSRII, 58:538-546 ; Cheung WL, J Meeuwig, M Feng et al (2012) Climate-change induced tropicalisation of marine communities in Western Australia, Marine and Freshwater Research); b) confirmation of ocean acidification in sub-Antarctic waters (time series records of sub-Antarctic surface water chemistry show a CO2 increase consistent with the long-term atmospheric CO2 record measured in New Zealand (Currie, K. I., Reid, M. R., and Hunter, K. A., 2011, Interannual variability of carbon dioxide drawdown by subantarctic surface water near New Zealand. Biogeochemistry 104: 23–34.) c) Impacts of ocean acidification of marine foodwebs in sub-Antarctic waters, with reductions in Foraminifera shell thickness (van Moy et al, 2009: Reduced calcification in modern Southern Ocean planktonic foraminifera. Nature Geoscience, 2:276-280), Pteropod abundance (Roberts et al, 2011; Polar Biology, Polar Biol DOI 10.1007/s00300-011-1024-z), and also potential loss of cold water corals which provide important habitats for other organisms (Miller et al, 2011, PLOSOne 6:e19004). Ocean acidification effects in Australian waters are recently summarised in the Annual report Card (http://www.acecrc.org.au/access/repository/resource/f083e1ac-bc49-102e-bf5a-4040d04b55e4/ACE%20OCEAN%20ACIDIFICATION%202011%20WEB3%20(2).pdf) (Cliff Law, NIWA)	Agreed. Some of these additional references have been published since this draft was completed, and have been used to replace "placeholders" - e.g. Marine heatwave - Wernberg et al 2012 for Pearce et al 2011; Added Cheung et al 2012.. The suggested exampls for NZ (Miller et al) was added. Johnson et al 2011 already cited; Suthers et al 2011 is introduction to special issue; Cheung et al has also been added.
394	53577	25	21	39	21	39	Please define EEZ. (Kristie L. Ebi, IPCC WGII TSU)	Exclusive Economic Zone - this has been spelled out
395	49353	25	21	40	0	0	Considered hot spots why? (Graeme Pearman, Monash University)	We feel the reference to hotspots "of global marine biodiversity with many rare, endemic and commercially important species" is self-explanatory. Section 25.6.2.1 provides more detail on the rate of warming.
396	51518	25	21	44	21	44	"likely" -- If this term is being used as calibrated uncertainty language, it should be italicized. Otherwise, the author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	This has been changed to a high confidence statement.
397	49354	25	21	50	0	0	Say in summary how it is "affecting the oceans". (Graeme Pearman, Monash University)	The next part of the section provides this detail.
398	41667	25	21	50	22	2	What is/are the detected impacts in New Zealand? None is given in the paragraph. (Lourdes Tibig, The Manila Observatory)	There is less evidence for NZ, but the point has been strengthened with a few more references in revision
399	38659	25	21	50	22	22	Various papers relating to marine ecosystems may be relevant here in special issue of Marine and Freshwater Research Volume 62 Number 9 "Climate change and Australian Aquatic Environments, Fish and Fisheries"; as is the Marine Climate Change Report Card: The marine climate report card: Report Card of Marine Climate Change for Australia; detailed scientific assessment, ES Poloczanska, AJ Hobday & AJ Richardson (eds), NCCARF Publication 05/09, ISBN 978-1-921609-03-9, pp. 29-51. (http://www.oceanclimatechange.org.au/content/index.php/site/welcome/ may be useful for various "marine" parts of this chapter. (Janice Lough, Australian Institute of Marine Science)	A number of papers from this special issue have already been cited (Hobday and Lough, Lough and Hobday, Pratchett et al, Gillanders et al). The Marine Report Card - a synthesis - was released in August 2012, and summarizes much of this literature - the Lovelock et al review for mangroves was added to support a subsequent sentence..
400	42588	25	21	50	22	22	25.6.3.1: in the reference here to changes in distribution and abundance of marine species in New Zealand there is a useful comment made on the importance of ENSO dominating the many time series. I would suggest many users have no idea what this type of statement now means. This important sentence again highlights the need to spell out somewhere in the documentation of WG2 the large numbers of climate mechanisms that can and will continue to dominate climate impacts for many decades to come as well as also intersecting with climate change processes. (Roger Stone, University of Southern Queensland)	We agree with this comment on highlighting the importance of ENSO (and other factors that contribute to climate variability). Section 25.2 paragraph 2 now includes a brief discussion on such regional climate influencers. There is also a much more extensive discussion on ENSO and other factors and their effects on Australasian climate in WGI chapter 14, which is referenced in Section 25.2.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
401	41525	25	21	51	0	0	Key references to changes in New Zealand marine environment that are linked with climate change effects are missing. Eg Authors include NIWA scientists-Trevor Willis, Cliff Law, Phil Boyd, Kim Currie, Phil Sutton; Otago University Scientists, Victoria University scientists, Auckland University scientists. see Willis et al. 2007. Climate change and the New Zealand marine Environment. NIWA Client report NEL2007-25. released on website for some of references http://www.niwa.co.nz/sites/default/files/import/attachments/CC_report_final_Dec-07.pdf ; Beentjes, M.P., Renwick, J.A. 2001. The relationship between red cod, Pseudophycis bachus, recruitment and environmental variables in New Zealand. Environmental Biology of Fishes 61: 315–328. Bowen, M. M., Sutton, P.J.H., Roemmich, D. 2006. Wind-driven and steric fluctuations of sea surface height in the southwest Pacific, Geophys. Res. Lett., 33, L14617, doi:10.1029/2006GL026160. Boyd, P.W. (2011). Beyond ocean acidification : commentary. Nature geoscience. Vol. 4, no. 5: 273-274. Chang, F.H., Mullan, B. 2003. Occurrence of major harmful algal blooms in New Zealand: is there a link with climate variation. The Climate Update 53: 4. Chiswell SM 1996. Variability in the Southland Current, New Zealand. New Zealand Journal of Marine and Freshwater Research 30: 1-17. Chiswell, S.M; Booth, J.D. 2005. Distribution of mid- and late-stage Jasus edwardsii phyllosomas: implications for larval transport. New Zealand Journal of Marine and Freshwater Research 39. 1157–1170. Chiswell, S.M; Booth, J.D. 2007. Sources and sinks of larval settlement in Jasus edwardsii around New Zealand: Where do larvae come from and where do they go? Marine Ecology Progress Series 354: 201-217. Currie, K.I.; Reid, M.R.; Hunter, K.A. (2011). Interannual variability of carbon dioxide drawdown by subantarctic surface water near New Zealand. Biogeochemistry. Vol. 104, 1-3.: 23-34. Dunn, M.R.; Hurst, R.; Renwick J.; Francis, R.I.C.C.; Devine, J.; McKenzie, A. 2009 . Fish abundance and climate trends in New Zealand. New Zealand Aquatic Environment and Biodiversity Report No. 31. 75 p. Francis M.P. 1993. Does water temperature determine year class strength in New Zealand snapper (Pagrus auratus, Sparidae)? Fisheries Oceanography 2(2): 65–72. Francis, M.P. 1994a. Growth of juvenile snapper, Pagrus auratus (Sparidae). New Zealand Journal of Marine and Freshwater Research 28: 201–218. Francis, M.P. 1994b. Duration of larval and spawning periods in Pagrus auratus (Sparidae) determined from otolith daily increments. Environmental biology of Fishes 39: 137–152. Gilbert D.J., Taylor, P.R. 2001. The relationship between snapper (Pagrus auratus) year class strength and temperature for SNA2 and SNA7. New Zealand Fisheries Assessment report 2001/64. 33p. Hanchet, S. M., Renwick, J. A. 1999: Prediction of year class strength in southern blue whiting (Micromesistius australis) in New Zealand waters. New Zealand Fisheries Assessment Research Document 99/51. 24 p. Hayward, B.W.; Bostock, H.C.; Neil, H.L.; Carter, L. (2011). Planktic foraminifera-based sea-surface temperature record in the Tasman Sea and history of the Subtropical Front around New Zealand, over the last one million years. Marine micropaleontology.	See previous comment.
401.2	41525	25	21	51	0	0	Vol. 82-83: 13-27 Hurd, C. L., Cornwall, C. E., Currie, K., Hepburn, C. D., McGraw, C. M., Hunter, K. A., & Boyd, P. W. (2011). Metabolically induced pH fluctuations by some coastal calcifiers exceed projected 22nd century ocean acidification: A mechanism for differential susceptibility? Global Change Biology. Advance online publication. doi: 10.1111/j.1365-2486.2011.02473.x Schiel DR (2011) Biogeographic patterns and long-term changes on New Zealand coastal reefs: Non-trophic cascades from diffuse and local impacts. Journal of Experimental Marine Biology and Ecology 400:33-51. Sewell, M.A., Hofmann, G.E. (2011). Antarctic echinoids and climate change: a major impact on the brooding forms. Global Change Biology 17: 734-744 Sutton, P., Bowen, M., Roemmich, D. 2005. Decadal Temperature changes in the Tasman Sea. N.Z. Journal of Marine and Freshwater Research 39(6): 1321–1329. Sutton, P.J.H.; Roemmich, D.; 2001. Ocean temperature climate off north-east New Zealand. N.Z. Journal of Marine and Freshwater Research 35: 553–565. Sutton, R.T.; Dong, B.; Gregory, J.M. (2007). Land/sea warming ratio in response to climate change: IPCC AR4 model results and comparison with observations. Geophysical Research Letters, 34, L02701, doi:10.1029/2006GL028164. Thompson, D.W.J.; Solomon, S. (2002). Interpretation of recent Southern Hemisphere climate change. Science, 296, 895-899. Willis, T.J., Handley, S.J., Chang, F.H., Morrisey, D.J., Mullan, B., Pinkerton, M., Rodgers, K.L., Sutton, P.H.J., Tait, A. 2007. Climate change and the New Zealand marine environment. NIWA Client Report for the Department of Conservation: NEL2007-025 October 2007, NIWA Project: DOC08305 Zeldis, J.R. 2004. New and remineralised nutrient supply and ecosystem metabolism on the northeastern New Zealand continental shelf. Continental Shelf Research 24: 563–581. Zeldis, J.R, Howard-Williams, C, Carter, C.M., Schiel, D.R. 2008. ENSO and riverine control of nutrient loading, phytoplankton biomass and mussel aquaculture yield in Pelorus Sound, New Zealand. http://www.int-res.com/articles/meps2008/371/m371p131.pdf Hurst, R.J.; Renwick, J.A.; Sutton, P.J.H; Uddstrom, M.J.; Kennan, S.C.; Law, C.S.; Rickard, G.J.; Korpela, A.; Stewart, C.; Evans J. (2012).Climate and ocean trends of potential relevance to fisheries in the New Zealand region. New Zealand Aquatic Environment and Biodiversity Report No. 90.202p. O'Driscoll, R.L.; Hurst, R.J.; Dunn, M.R.; Gauthier, S.; Ballara, S.L. (2011). Trends in relative mesopelagic biomass using time series of acoustic backscatter data from trawl surveys. New Zealand Aquatic Environment and Biodiversity Report No. 76. (Mary Livingston, Ministry for Primary Industries)	
402	42534	25	22	1	22	1	no need to define acronym (EAC) since it's not used elsewhere (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	EAC removed

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
403	41668	25	22	1	22	2	Statement is ambiguous. Is the faster rate of warming in oceans in southeast Australia a result of the poleward advance of the East Australian Current or vice-versa? (Lourdes Tibig, The Manila Observatory)	It is due to both warming and extension of the EAC. Changed the underlined part: - "The rate of warming is even faster in southeast Australia, due in part to the poleward advance of the East Australia Current of ~350 km (Ridgway, 2007; Wu et al., 2012). "
404	41669	25	22	4	22	11	Confidence levels in detection and attribution of observed impacts of climate change on marine species in Australia are indicated only in Table 25-1, FOD). It is suggested that these should also be indicated in the text, or when the graphic representation of detection and attribution of observed impacts to climate change are shown in SOD (See placeholder, page 19), these can be referred to in the text. (Lourdes Tibig, The Manila Observatory)	The decision to only show confidence levels in the table is aimed at saving space, no change made as these are indeed included in the table. Chapt 25 has elected not to use the Detection and Attribution figure being included in some other chapters.
405	49355	25	22	4	22	11	Another piece of text that might be better presented as a tabulation. (Graeme Pearman, Monash University)	We have elected to retain this as text.
406	41670	25	22	13	22	17	It is suggested that confidence levels of the detected habitat-related and distributional changes be indicated, including that of the attribution, if any. (Lourdes Tibig, The Manila Observatory)	Statements of confidence levels are not approparitate for these examples, no change made.
407	42535	25	22	15	22	16	"for the first time" is vague. During what monitoring period? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	First time ever reported…so probably confident not in the last 50 years…"changed to read - The 2011 marine heat wave in Western Australia caused the first-ever reported bleaching at Ningaloo reef, …")
408	41671	25	22	17	22	19	What are the many observed ecological changes in Australia which can be attributed to ocean warming? (Lourdes Tibig, The Manila Observatory)	This sentence has been deleted to save space and because it essentially re-states issues reported earlier in this section.
409	46559	25	22	17	22	19	Does “attributed to ocean warming” simply mean ‘associated with changes in ocean temperature’? Or is this implying an attribution to long-term trends (much more difficult) and not evidenced by the studies. There is also a conflict between “attribution”, “remains difficult to separate impacts” and “high confidence”. This reader was not sure which object (finding) the Las had high confidence in, nor how you could reconcile an attribution to one effect while at the same time admitting it was difficult separate (uniquely associate) impacts. (Neville Smith, Bureau of Meteorology)	This sentence has been deleted to save space and because it essentially re-states issues reported earlier in this section.
410	46560	25	22	19	22	20	At least some of the Australian studies (eg bleaching) are also seeing ENSO-related/CV impacts. (Neville Smith, Bureau of Meteorology)	Agreed. We have added De'ath et al. 2012 to an earlier section: About 10% of the observed 50% decline in coral cover on the Great Barrier Reef has been attributed to bleaching, the remainder to cyclones and predators (De’ath et al., 2012).
411	49356	25	22	19	22	20	This reads dangerously like we know it is happening we just can’t observe it? Is there a need to provide evidence from fishing catches and or delineate between climatic effects and fishing activities? (Graeme Pearman, Monash University)	The sentence has been changed to read - "Changes in distribution and abundance of marine species in New Zealand are primarily linked to ENSO-related variability that dominates in many time series "
412	42302	25	22	19	22	22	I totally agree with the ENSO point. Actually there is clear evidence of impacts of El Nino on sooty shearwater (Puffinus griseus) abundance. This is a widespread apex predator that has dominant influence on 40+ island ecosystems (it's an ecosystem engineer that forms soil, deposits nutrients and biopedturbates the soil, impacts on plant regeneration and affects a whle suite of invertebrates), many of which are natiure reserves. I can supply a full set of references for these links if wanted. The overall decline in sooty shearwaters and knock-down as an El Nino forms is best documented by Lyver et al. 1999; Clucas 2011; and Clucas et al. 2012). However the crucial gap remains that we don't know if the ENSO is affected (see my earlier comments above) and so far the critical examination of the potential (NOT PROVEN) link between CC and ENSO is only covered by Bragg et al. (2007) and Moller et al. (2009) in this shearwater impact context. References: Lyver, P., Moller, H., Thompson, C. Changes in Sooty Shearwater (Puffinus griseus) chick production and harvest precede ENSO events. Marine Ecology Progress Series. 188: 237 – 248. (1999); Clucas R 2011. Long-term population trends of sooty shearwater (Puffinus griseus) populations revealed by harvest success. Ecological Applications 21: 1308- 1326.; Clucas, R.; Moller, H.; Bragg, C.; Lyver , P.O’B.; Fletcher, D.; Lyver, P.O’B.; Newman, J. Rakiura Maori Muttonbirding diaries: monitoring trends in Tītī (Puffinus griseus) abundance in New Zealand. New Zealand Journal of Zoology. 39: 155-177. (2012) (Henrik Moller, University of Otago)	The Clucas et al reference has been added
413	41526	25	22	21	22	22	"In New Zealand climate change effects remain undocumented". Sentence is ambiguous. Research to date (admittedly not a lot) has not found any obvious shifts in fish distribution or fish productivity, however, recruitment success has been linked to SST for several species (papers by M. Beentjes, M. Francis, J. Renwick (Mary Livingston, Ministry for Primary Industries)	We have changed the sentence: "Changes in distribution and abundance of marine species in New Zealand are primarily linked to ENSO-related variability that dominates in many time series". The SST reference has also been added.
414	45143	25	22	25	0	0	Note there is some emerging work on rates of accretion on marshes in SE Queensland coming out at present (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	We cannot include this reference as it has not yet been published. We have, however, added Rogers et al 2012 to cover this topic.
415	51519	25	22	27	22	27	The author team may wish to clarify the description of evidence to date for coastal habitats as "limited," given that the previous subsection presents a number of citations that could be interpreted as evidence for climate impacts in this environment--at least if one employs a broad definition of coastal habitats. As a more minor point, the phrase "limited evidence" should be italicized, assuming it is being used as a calibrated term per the uncertainties guidance for authors. (Katharine Mach, IPCC WGII TSU)	The word is not meant to be part of a calibrated evaluation of the literature; we feel that 'limited' is still a useful descriptor given the relative scarcity of evidence to date compared to the wide range of habitats, and changes due to non-climatic drivers.
416	46561	25	22	30	0	0	Given the lack of confidence and irregularity in precipitation changes through Australasia and is not possible to attach medium confidence to soil subsidence from reduced rainfall. There is a conflict between the limited evidence and the confidence levels. (Neville Smith, Bureau of Meteorology)	Sentence now reads: "....and exacerabated by soil subsidence if rainfall declines " to make the soil subsidence conditional on where rainfall declines, rather than assuming that it will decline.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
417	38944	25	22	31	22	31	Suggested citation, along with DCC(2009): Rogers K., Saintilan N. and Copeland C. (2012) Modelling wetland surface elevation dynamics and its application to forecasting the effects of sea-level rise on estuarine wetlands. Ecological Modelling: http://dx.doi.org/10.1016/j.ecolmodel.2012.06.014 . This paper is a Hunter estuary (NSW) case study that uses detailed measures of eccretion rates, sea-level trends and elevation modelling to support the point made in the pervious sentence (ie, lines 28-31) (Neil Saintilan, Office of Environment and Heritage)	The following reference has been added: Rogers, K., Saintilan, N. & Copeland, C. 2012 Modelling wetland surface elevation dynamics and its application to forecasting the effects of sea-level rise on estuarine wetlands. Ecological Modelling 244, 148-157.
418	41527	25	22	35	0	0	Shellhash babitats and rhodolith beds have also been identified as potentially important for carbon capture in NZ. Simon Thrush; Wendy Nelson Nelson, W.A.; Neill, K.; Farr, T.; Barr, N.; D'Archino, R.; Miller, S.; Stewart, R. (in press...will be published by the time this publication is complete).RHODOLITH BEDS IN NORTHERN NEW ZEALAND: CHARACTERISATION OF ASSOCIATED BIODIVERSITY AND VULNERABILITY TO ENVIRONMENTAL STRESSORS New Zealand Aquatic Environment and Biodiversity Report No. xx (Mary Livingston, Ministry for Primary Industries)	We have investigated this paper (http://fs.fish.govt.nz/Doc/23064/AEBR_99.pdf.ashx) but cannot find any reference to carbon capture so have not included it
419	49357	25	22	35	0	0	The reality is that total amount of carbon involved in these species (e.g. sea grasses) is negligible in a national budget sense. Be careful. (Graeme Pearman, Monash University)	We disgree: The total amount is lower, but rate of capture may offer advantages; 50 x greater rates: Emily Pidgeon. Carbon Sequestration by Coastal Marine Habitats: Important Missing Sinks. The Management of Natural Coastal Carbon Sinks. IUCN. 2009. ; Australia's coastal wetland ecosystems store 5 times more carbon in their soils than those of our terrestrial ecosystems, including forests, on a per hectare basis; There is evidence and growing consensus that through avoided emissions, conservation, repair and sustainable use the world's coastal wetland ecosystems can play a major role in carbon management. Known as blue carbon sinks, mangroves, seagrass and saltmarsh can sequester and store carbon in their sediments and biomass at higher rates than those of terrestrial forests. Unlike most terrestrial ecosystems, the carbon stored in coastal wetland ecosystem sediments has extremely long residence times, potentially for millennia. This is at least worth noting, which has been shifted to the introductory para for this section.
420	46562	25	22	38	0	0	Changes in the main climate variables … (T, SL are not drivers) (Neville Smith, Bureau of Meteorology)	Sentence changed to "Change in temperature and rainfall, and sea level rise, …"
421	49358	25	22	38	0	0	Suggest, "Changes in climatic factors such as temperature, sea-level rise and rainfall, are..". (Graeme Pearman, Monash University)	Sentence changed to "Change in temperature and rainfall, and sea level rise, …"
422	46563	25	22	40	0	0	High-confidence that there will be an 'expected secondary effect' is not a significant finding. If the authors can only attach medium confidence to acidification impacts (and this is appropriate), it is hard to go higher elsewhere. (Neville Smith, Bureau of Meteorology)	Disagree - direct acidification impacts are far less understood than the secondary effects of temperature and rainfall on the species discussed.
423	41508	25	22	45	23	4	The discussion of vulnerability / impacts for corals in this chapter appears to be limited to "shallow water" coral ecosystems such as the Great Barrier Reef. I understand that deepwater corals can be particularly vulnerable to decrease in ocean pH (ocean acidification) through shoaling of the aragonite saturation depth. This is potentially a very important issue for NZ, but appears to be missing from this section. I suggest you contact Di Tracey or Cliff Laws of NIWA Wellington for references. (David Wratt, NIWA, New Zealand)	Agreed - several new papers now show deep-sea coral impacts (slowed growth) and these have been added to the section summarizing literature (Page 22, line 4-11)
424	38660	25	22	46	22	47	Redondo-Rodriguez et al (2011) reference does not seem appropriate here; also note Cooper et al 2012 Growth of Western Australian corals in the Anthropocene. Science 335: 593-596 regarding recent coral growth trends on Western Australian reefs. (Janice Lough, Australian Institute of Marine Science)	Redondo-Rodriguez et al 2011 reference has been removed and we hav,e added Cooper et al., 2012, also De'ath et al 2012 - a very important study as it "atributes" the observed bleaching to different causes.
425	38661	25	22	52	22	53	The reference to "de-coupling" of coral bleaching events from El Nino cycles either needs to be removed or further clarification provided - Veron et al (2009) basically note that many of the major recent bleaching events worldwide have been linked with El Nino events (which typically result in unusually warm SSTs in large parts of the tropical oceans), this will still continue in the future (presuming ENSOs continue) but, additionally, thermal stress causing bleaching will more frequently affect coral reefs independent of ENSO events; this study is also focussed on global events rather than specifically Australia. (Janice Lough, Australian Institute of Marine Science)	Wording has been revised to clarify.
426	49359	25	22	53	0	0	"Multiple other"? (Graeme Pearman, Monash University)	Changed to "other"
427	46564	25	22	54	0	0	Increased cyclone intensity comes with reduced frequency; Since TCs mix and cool the latter may be as important. (Neville Smith, Bureau of Meteorology)	Comment noted; this might appear plausible but there is not sufficient evidence in the literature that this would have as important an effect as an increase in the most severe cyclones.
428	43062	25	23	12	0	0	What about potential ecosystem outcomes? Not included as only model based so far with little ability to validate them to date? (Beth Fulton, CSIRO Marine and Atmospheric Research)	Most projections are from model-based studies, so we have also added:; "Ecosystem shifts are also projected by ecosystem models, resulting in changes to habitat and fisheries production (Fulton 2011 Watson et al., 2012)"

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
429	46565	25	23	12	0	0	It does not seem appropriate to use a confidence level with something that is "anticipated". Perhaps "will occur", or drop the confidence finding. (Neville Smith, Bureau of Meteorology)	Wording has been revised to be more consistent with a medium confidence finding.
430	49360	25	23	23	0	0	"suitable habitat" defined how? (Graeme Pearman, Monash University)	We believe the end of the sentence makes this point clear - no more shallow water
431	41251	25	23	23	45	47	The area given for Australian forests included woodlands and this needs to be qualified. Tall, closed forests comprise a much smaller area. (Stephen Turton, James Cook University)	Text modified to indicate inclusion of woodlands in the quoted area.
432	37499	25	23	26	23	30	The Great Barrier Reef Foundation has sponsored some work on adaptation in the GBR, including shading for some parts of the reef and translocation of key structural corals. I don't know whether this has been published in the peer-reviewed literature but Ove Hoegh-Guldberg would know. (Will Steffen, The Australian National University)	Added: Rau, G. H., McLeod, E. L. & Hoegh-Guldberg, O. 2012 The need for new ocean conservation strategies in a high-carbon dioxide world. Nature Climate Change, DOI: 10.1038/NCLIMATE1555.
433	42536	25	23	26	23	30	The Australian Bureau of Meteorology has developed a GBR bleaching early warning system. See http://www.gbrmpa.gov.au/__data/assets/pdf_file/0019/4285/gbrmpa_CoralBleachingResPlan2011.pdf (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Spillman et al papers - not adaptation options per-se, but forecasting of impacts that prepares managers. Added "Ocean forecasting is also being used to prepare managers for bleaching events (Spillman 2011)."
434	49361	25	23	33	0	0	"participants" or "fishers"? (Graeme Pearman, Monash University)	Not just fishers - managers, policy, processors, the whole supply chain. We have now used "stakeholders" instead
435	42303	25	23	37	23	40	Actually marine protected area planning in NZ is effectly stalled! You shouldn't imply adaptation is underway when the whole process is on hold. (Henrik Moller, University of Otago)	No change has been made because the text in our view does not imply that adaptation is underway, in fact it makes it clear that it isn't.
436	49362	25	24	1	0	0	This is a null hypothesis, not an observed fact. Indeed I am a bit concerned with the emphasis on CO2 fertilisation. Perhaps there should be reference to the findings of SEACI in which the impact of CO2 on stream flow (i.e. the hydrological budget) is shown to be very small, albeit with large uncertainties. (Graeme Pearman, Monash University)	Altered the text to shorten the statement here and omit the specific reference to CO2 as a confounding factor.
437	42537	25	24	5	24	5	replace "Western Australia" with "south-western Australia" since this is where rainfall has decreased (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Text modified as suggested
438	53578	25	24	7	24	9	Please provide the evidence for the confidence statements. (Kristie L. Ebi, IPCC WGII TSU)	There is a very large amount of research to suggest that forest productivity in Australia is predominantly controlled by water availability and that therefore any changes in water availability will be of greatest importance into the future. This statement is supported by such a broad range of studies and observations that it seemed inappropriate to pick out just one or two but rather to rely on the broad range of accumulated knowledge and understanding, as evidence in the entire paragraph.
439	46566	25	24	8	24	9	The very high confidence does seem at odds with the previous paragraph and the variations across climate regimes discussed elsewhere. (Neville Smith, Bureau of Meteorology)	The previous statement stated that it was not possible to detect any effects of current climatic changes because of the many confounding factors. The statement here refers to simply states that changes in water relations (rather than temperature) are the most important ones for future forest growth. We do not see a conflict between these statements.
440	42538	25	24	9	24	9	replace "Western Australia" with "south-western Australia" since this is where rainfall is projected to decrease (high confidence) (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Text modified as suggested
441	46567	25	24	16	0	0	"water relations generally" to "water relationships are generally" (Neville Smith, Bureau of Meteorology)	Text modified as suggested
442	53579	25	24	16	24	18	Is the confidence statement based on one paper? (Kristie L. Ebi, IPCC WGII TSU)	The cited study includes a review of a wide range of previous published work.
443	46568	25	24	18	24	19	"… can result … although … (medium confidence). Difficult to see how this will be interpreted since the object of the confidence level is vague. (Neville Smith, Bureau of Meteorology)	Rewritten to make it clearer
444	49363	25	24	22	0	0	"down-regulation"? (Graeme Pearman, Monash University)	This suggested addition has been ovelooked in error. Reference will be reviewed and added in final draft if appropriate.
445	41252	25	24	24	37	50	Reference to the refereed review by Wilson and Turton (2011) on adaptation strategies should be included here as it information in addition to that published by Booth et al. (2010) (ref to the NCCARF Forest Vulnerability Assessment Synthesis Project, Work Package 4). This report also identifies the vulnerable forest types and plantation areas. (Stephen Turton, James Cook University)	This suggested addition has been ovelooked in error. Reference will be reviewed and added in final draft if appropriate.
446	38267	25	24	25	24	25	Could not find box 25-7. There is no figure or table referred to as 25-7. (Guillaume Simioni, INRA)	The box could be found on page 34/35 in the draft; it has now been re-numbered as Box 25-6.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
447	37500	25	24	37	24	50	Another approach to adaptation in forestry is to "hedge one's bets" in replanting after harvesting or fire by anticipating a range of possible future climates and varying the replanting to take this into account. This idea - from Mark Stafford Smith of CSIRO - was published in the Steffen et al. 2009 reference that is already cited in the chapter. (Will Steffen, The Australian National University)	We believe that the simple notion of 'hedge our bets' hides a range of problems. Since we don't know what exact future will actually eventuate, a hedge-betting strategy would require the adoption of a strategy that would be suitable under all possible future scenarios. This might well be the most robust approach to adopt, but such a strategy would also be sub-optimal under any one of those futures, as well as under current conditions. It means using a species that can perform well under a range of climates, but performs sub-optimally under the current climate. That is the hidden cost of this approach. It also requires one to define the limits of the hedging. Do we require to use species that perform adequately with 10% less rainfall (for example), or do we need to look at species that can tolerate rainfall reductions of 50%? So, even if one accept the validity of the strategy in principle, it is associated with considerable practical difficulties. We therefore do not believe that it would be appropriate to include a text as suggested without considerable discussion and qualifications, and there is no space in the text to add such qualifiers. The strategy might be more appropriate when it comes to future proofing native ecosystems, which is where we understand the idea originated.
448	49364	25	24	39	0	0	"Provenance selection" is jargon. (Graeme Pearman, Monash University)	We appreciate that 'provenance' is not a term that may be known to all readers but there is no alternative term that could be used to replace it. Provenance refers to plant material from a specific geographic location that may give it greater tolerance to specific climatic conditions than the mean for a species. Changing genetic material by selecting different provenances is thus a subtler response to changing climatic conditions than changing species, and it is an important aspect of the possible response that should be highlighted here.
449	49365	25	24	42	0	0	I still struggle with the concept of limited evidence but high agreement??? (Graeme Pearman, Monash University)	Most modelling studies, and the ones applied to climate change simulations in Australia and New Zealand, use similar assumptions about the response of photosynthesis to CO2 concentration. There is therefore high agreement between the studies. However, the empirical evidence in support of the use of these formulations is limited. There is a wealth of short-term glass-house studies and a more limited range of CO2 enrichment studies under field conditions. These observations form the basis for selecting the chosen formulation in models, and there is high agreement that the formulation best captures the range of observations as they are. But field experiments still leave unresolved apparent contradictions between observations, uncertainty about the interactions between different factors and uncertainties about long-term responses and feed-backs. Obviously, there is no observational evidence of the growth response to long-term CO2 enrichment. Hence, the statement of limited evidence. While slightly complicated, we believe that the confidence and agreement statements as provided, do, indeed, correctly portray the current state of evidence and agreement.
450	46569	25	24	44	0	0	How can very high confidence be attached to a statement that is based on limited evidence? (Neville Smith, Bureau of Meteorology)	Wording has been revised and reduce to meet space constraints, and the high confidence statement deleted.
451	46570	25	24	49	0	0	Delete "in particular". These "barriers" call into question some of the attributions of very high/high confidence prior. (Neville Smith, Bureau of Meteorology)	Text modified as suggested. While full and detailed adaptation requires detailed knowledge of the precise nature of climatic changes and plant responses to elevated CO2, the statement made in the text above and assigned high confidence ratings are generally believed to be true even within reasonable bounds of uncertainty around regional climate change and CO2 responses.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
452	42539	25	25	3	25	3	Is it worth reminding the reader that agriculture accounts for 11% of Australian GDP (page 11, line 27)? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Wording changed to refer particularly to domestic food production and share of agriculture in exports.
453	51520	25	25	3	25	5	It could potentially be helpful to clarify the units relevant to the described "total exports." For example, the also-characterized food requirements and agricultural production are presumably in units related to caloric or physical amounts of food, whereas the exports are presumably measured in terms of monetary value? (Katharine Mach, IPCC WGII TSU)	We have made it clear now that this is total export value.
454	42269	25	25	4	0	4	If dairy exports are 15% of GDP and are also 26% of total exports, it implies that exports are 58% of GDP. This is way too high. See: http://www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/NationalAccounts_HOTPYeMar11.aspx. I suggest checking with author who wrote this paragraph. (Adolf Stroombergen, Infometrics)	Thank you for this correction. In fact we have taken out the reference to GDP and focussed on the contribution to exports which we feel gives a more generally understandable indication of the importance of the sector.
455	49366	25	25	6	0	0	Factors not drivers. (Graeme Pearman, Monash University)	Changed as suggested.
456	46571	25	25	6	25	9	Here the implication is that detection is chasing the climate signals cf climate change signals. The term “global change” is also introduced (good) but it will need to be defined in the glossary and used consistently through WG II. (Neville Smith, Bureau of Meteorology)	Global change' is now in the glossary.
457	42540	25	25	7	25	7	Even though it's hard to attribute causes of observed impacts, it would still be worth describing the observed impacts - are there any interesting trends in production? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We are not sure that general trends provide much insight into the climate change issue given the number of factors that might be responsible. Any such statements would likely be misleading as they would/could be incorrectly be unerstood to be about the impacts of climate change already observed.
458	40632	25	25	18	25	26	Recently-completed work (Moore & Ghahramani in prep.) for sheep & cattle production across southern Australia has addressed the pasture-> livestock production nexus, changes to the water cycle and the mediating effects of management. Key outcomes include: (a) pasture production largely tracks rainfall in the rest of southern Australia also (b) livestock production is more sensitive to changing climate than pasture NPP. Since some NPP must be left unconsumed in order to preserve the soil, a proportional reduction in forage growth translates into a larger proportional reduction in safely-consumable NPP (c) livestock production systems in lower-rainfall environments are more vulnerable to climate change in the absence of adaptation, because of a combination of differing precipitation trends & because they are starting from a more-vulnerable state (d) combinations of existing technologies (changes to the feedbase, livestock genetics & changes to stocking rates & supplementary feeding) should, if adopted, be sufficient to maintain economic viability to 2030; In drier environments in particular, vulnerability increases over time (Andrew Moore, CSIRO)	We thank the reviewer for drawing our attention to this new work and have included much of this material in the revised version of this section.
459	42589	25	25	22	25	26	do the authors mean production changes being greater than changes in rainfall or greater than 'production' overall? (Roger Stone, University of Southern Queensland)	This sentence has been removed from the revised text.
460	46572	25	25	23	0	0	Production greater than rainfall does not make sense. Perhaps ‘the percentage change in production” (Neville Smith, Bureau of Meteorology)	This sentence has been removed from the revised text.
461	49367	25	25	24	0	0	“will be greater in percentage terms..” (Graeme Pearman, Monash University)	This sentence has been removed from the revised text.
462	41510	25	25	28	25	38	I think Troy Baisden of GNS Science lower Hutt may have done some more work on impacts of climate change (including also CO2 change) on NZ pastoral production since this 2008 reference, but I can't find any more recent published stuff from him on this topic through Google. I suggest contacting him to check. (David Wratt, NIWA, New Zealand)	Thank you; Troy Baisden has been contacted and has added more recent information on national level responses for NZ.
463	36438	25	25	28	29	0	these figures seem implausible. See S Gray and R Le Heron: Globalising NZ: Fonterra Co-operative Group and shaping the future, NZ Geographer, 2010, 66 (1), 1-13 for a less physically determined analysis. (Eric Pawson, University of Canterbury)	The reviewer makes a good point about the ability of the NZ dairy industry to adapt and avoid this 'physically determined' outcome. However, we are making a statement here about the direct climate change effects in NZ and Australia and feel this point remains valid. The reference to Lee et al 2012 helps put the physical change into perspective.
464	49368	25	25	29	0	0	“downscaled” how? (Graeme Pearman, Monash University)	The relevant sentence has been removed.
465	46573	25	25	31	0	0	Not sure what the confidence level is being attached to. Impacts varying regionally? The actual numbers? Given the limited evidence, attaching any confidence level would seem a stretch. Same applies lines 33-34. (Neville Smith, Bureau of Meteorology)	The regional statements referred to here have been removed.
466	42541	25	25	33	25	33	IPCC style normally puts the reference(s) at the end of the sentence inside brackets (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Changed as suggested.
467	43719	25	25	40	0	0	About here it should be noted that research in NZ, closely linked to work done at Rothamstead in the UK, is showing evidence for being able to develop better drought tolerance for wheat in particular, but with relevance for crop breeding or genetic modification in the NZ context - see: Semenov, M.A., Martre, P., and Jamieson, P.D., 2009: Quantifying effects of simple wheat traits on yield in water-limited environments using a modelling approach. Agricultural and Forest Meteorology, 149, 1095-1104. (Martin Manning, Victoria University of Wellington)	Plant and Food staff comment that breeding for drought tolerance is not a particular priority and hasn't demonstrated exceptional progress so we feel that it would be misleading to highlight this research here.
468	49369	25	25	40	0	0	Suggest remove “For” from beginning of sentence. (Graeme Pearman, Monash University)	Reworded as suggested.
469	46574	25	25	48	25	49	I think “the impacts from climate change will manifest through water availability” is better than “water availability will determine the impacts of climate change”. (Neville Smith, Bureau of Meteorology)	Sentence has been reworded based on this suggestion.
470	41511	25	25	53	0	0	You might also like to examine: Tait, A.B., 2008: Future projections of growing degree days and frost in New Zealand and some implications for grape growing. Weather and climate 28, 17-36. (David Wratt, NIWA, New Zealand)	Tait reference included.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
471	39108	25	25	53	26	1	There are lots of references here, including a number from the same authors. Perhaps an opportunity for reducing amount of text. (Lynda Chambers, Australian Bureau of Meteorology)	Number of references has been reduced.
472	53580	25	26	10	26	10	Future proofing? (Kristie L. Ebi, IPCC WGII TSU)	This phrase is no longer used in the revised text.
473	42542	25	26	10	26	16	This paragraph is mostly about adaptation, so it perhaps belongs in section 25.6.5.2 (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	As there are references to adaptation throughout the text it has been decided to combine the impacts and adaptation into one section and structure the overall agriculture section by sub-sector instead, concluded by some overarching adaptation issues.
474	40633	25	26	21	26	22	The $540M and $2150M values are given with spurious precision - a single significant figure is all that this kind of study can possibly support (Andrew Moore, CSIRO)	Dollar values have been replaced in the text with the percentage change in the value of agriculture, consistent with the indicated level of precision.
475	46575	25	26	21	26	22	Wording: … The median projection of reduced WATER inflow [DELETE for] under THE A1FI emissions SCENARIO is predicted to result in losses IN VALUE of A$540 million by 2030 and A$2.15 billion by 2050 (Quiggin et al., 2008). Under this median PROJECTION and the 'dry' "business as usual" … (Neville Smith, Bureau of Meteorology)	Text amended based on this and other comments on this para.
476	51521	25	26	21	26	23	For this projection, it is not completely clear whether the relevant geographical scope is the Murray-Darling Basin or all of Australia. (Katharine Mach, IPCC WGII TSU)	This sentence has been removed from the revised draft.
477	49370	25	26	28	0	0	"will"? (Graeme Pearman, Monash University)	"will" is correct here as the dryland areas are the only sites available for expansion. Re-wording captures better that the key feature of expansion is increased reliance on irrigation, rather than dryland expansion per se.
478	37501	25	26	32	26	44	The section on adaptation in agriculture seems far too short. There has surely been much activity to report on here. To keep within page limits, perhaps the section on projected impacts could be shortened (we've seen a lot of this before) and more attention could be given to examples of adaptation that is already occurring. I'm sure Mark Howden and Mark Stafford Smith could contribute more here. Or is Box 25-5 meant to cover this? You might also cite Box 25-6 here, which has some good material about adaptation in agriculture/rural communities (Will Steffen, The Australian National University)	There is certainly more information than can be covered in the available space. We have re-structured the adaptation section to integrate adaptation issues into sub-sectoral (livestock and cropping) perspectives, which hopefully strengthens the role of adaptation overall for the agriculture section. However, space constraints limit the amount of material that can be included.
479	46576	25	26	34	0	0	Is the whole of section 25.3 relevant here; this was touched on in part in 25.3.2. (Neville Smith, Bureau of Meteorology)	The reference was to section 25.5 (adaptation), not 25.3. Our revised draft now makes more explicit discussion of adaptation issues and hence we removed this generic cross-reference, but included a specific cross-reference to Box 25-2 (on water management).
480	45144	25	26	38	0	0	I would say that Stafford Smith et al 2011 here is a general reference and could be omitted - Park et al 2012 is more specifically Australian (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	We have kept the reference in the SOD to indicate that there is more than just one study dealing with the issue of transformation, but will consider for the FGD whether this is still appropriate and necessary subject to other material becoming available by then.
481	46577	25	26	38	0	0	Noting the definition of adaptation limits (limit to adaptation) in Ch26 (see also comments on 25.3.3), is this the correct terminology here (incremental does not fit). I think "limits to on-farm adaptation" is what is intended. (Neville Smith, Bureau of Meteorology)	Redrafting uses incremental and transformational as defined in the glossary, with a substantially revised text.
482	42304	25	26	50	27	2	See my earlier comments about invasive species impacts. Biosecurity is not just about new incursions - it's as much about management of species already here. Impacts on Tb, agriculture and apiculture (wasps), recreation (wasp) over and above impacts on ecosystems perhaps deserve a mention? (Henrik Moller, University of Otago)	The Table does cover changes in species already present; the reviewer mentions some important examples but we have not been able to find published studies on these.
483	46578	25	26	51	26	52	"There is high confidence that the potential risk from invasive and pathogenic species will be altered by climate change" is a zero value statement. "altered" could be small or large, and it includes both natural and anthropgenic change. It is virtually certain. (Neville Smith, Bureau of Meteorology)	We agree with the reviewer that this assertion had little value. The introduction to the Box now reads "There is high confidence that the biology and potential risk from invasive and native pathogenic species will be altered by climate change (Roura-Pascual et al., 2011), but these impacts may be positive or negative depending on the particular system. "
484	41512	25	27	10	28	18	Box 25.6: One thing possibly missing from this box is that given the general picuture portrayed elsewhere in this chapter of NZ being rather less vulnerable to climate change than Australia (and perhaps many other countries), there may be some relative advantages to NZ rural areas. For example, if NZ continues to have reasonably reliable rainfall and adequate water resources dairy production and horticultural production may be less impacted than in many other countries, and revenue from selling such products may increase. This is not my specialist area so I can't point you to any published literature on this - but I suggest it is worth looking for any such literature. (David Wratt, NIWA, New Zealand)	Text has been revised in response to this and other general comments. Note that the overall comparison of vulnerability between Australia and New Zealand has been removed following review comments pointing out the difficulties of making such a comparison. The text already notes the high diversity of vulnerability in rural communities, but it has been placed at the end of the first paragraph to make this clearer as a conclusion. Other aspects suggested by the reviewer go into more detail than this text can cater for, given space constraints.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
485	36439	25	27	14	16	0	this assertion is far too general. Some rural regions are very well off, eg those close to metro regions, or places like Queenstown-Lakes in the South Island of NZ. Again, there seems to be a deterministic streak to this chapter which takes little account of regional realities/variations. There is also evidence of widespread rural innovation: see H campbell, R Burton, M Cooper et al, From agricultural science to biological economies? NZ Journal of Agricultural Research 2009, 52, 91-97 (Eric Pawson, University of Canterbury)	The reference to lower living standards has been removed, including due to the difficulty in defining living standards and the diversity of different types of rural communities. Given this revision, the suggested reference does not seem relevant anymore here.
486	41513	25	27	14	27	16	This statement about rural incomes and standards of living being lower than urban ones is vary broad. Although it is not my area of expertise I am not convinced by it - are not some of the worst "real" standards of living in NZ in some of our poor urban areas ? Also I would have thought that rural communities based on dairying may have done rather well recently in NZ? This looks to me like a rather unhelpful generalisation, given there are huge variations in standards of living both within rural populations and within urban populations. (David Wratt, NIWA, New Zealand)	The reference to lower living standards has been removed, including due to the difficulty in defining living standards and the diversity of different types of rural communities.
487	51522	25	27	27	27	27	The wording on this line could be revised slightly to reduce potential interpretations of policy prescriptiveness. (Katharine Mach, IPCC WGII TSU)	Wording revised to highlight that this has implications for governance, rather than stating that this "requires" a change.
488	42543	25	27	44	27	48	What about the cost of the 1997-2009 drought? Extract relevant data from Productivity Commission (2009). Note the recommendations from this report, e.g. shifting away from government subsidies to better business risk management systems. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The Productivity Commission report (2009) does not actually provide costs for the entire drought period. It does provide costs for the 2002-03 period, but uses the same ABS (2004) reference to do so.
489	49371	25	27	45	0	0	Net or gross income? (Graeme Pearman, Monash University)	Upon double checking we noticed that the report refers to agricultural rather than farm income, hence the question cannot be answered directly. Text revised accordingly.
490	49372	25	27	46	27	47	Remove “points”. We don’t have to use jargon invented by others. (Graeme Pearman, Monash University)	Reject: The percentage "point" is the correct technical term, because we referred to a change in the growth rate. However, within the precision of the figure, we feel that following the reviewer's suggestion is sufficiently defensible, and the text has been revised accordingly.
491	37502	25	27	48	27	48	Remove comma after "during 2007-2009" (Will Steffen, The Australian National University)	Done
492	49373	25	28	1	28	54	Regarding carbon farming. I suggest some care here. The emphasis of carbon farming (and biofuels), be they seen as adaptation or mitigation, need to be treated carefully. They is clearly on the agenda of both major Australian political parties, yet scientific assessment shows that bio-sequestration of carbon, or the use of biomass as fuel are adaptive options that have extremely limited value. See: Pearman, G.I. (2012). Biofuels and biosequestration in perspective. Academy of Technological Science and Engineering Focus171, 35-37. Indeed the push from governments and interested community sectors in both of these matters might be seen as a classical example of how policy might no be evidence based. (Graeme Pearman, Monash University)	This comment appears not relevant for this section, as the text does not make a specific judgement on carbon farming but refers to diversification and alternative land-uses in general. No change made.
493	49374	25	28	1	28	54	There should be a sentence or two on transport fuels and technologies as mitigative and/or adaptive strategies. There also need to be some comments about the tradeoffs between biofuel production and other land uses. (Graeme Pearman, Monash University)	Again we are unsure that this comment actually relates to this box. Referred to Box 25-10. No change made here, and we also did not feel that a specific change was warranted to Box 25-10 over an above other revisions that hopefully also addressed this concern about trade-offs.
494	45145	25	28	14	0	0	"CC will impact...and environmentally" - this is a very woolly statement and not true since clearly there can be ill-prepared communities that never get exposed. Sharpen up or omit. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Wording has been revised and sharpened. The original sentence was indeed so broad as to convey little novel insight.
495	36440	25	28	18	0	0	see the ref to Cradock-Henry on p 12. He is now working on the social science of climate change adaptation and resilience at Landcare Research, Lincoln, NZ and would be a good reviewer of this chapter. (Eric Pawson, University of Canterbury)	Nick Cradock-Henery has been invited to review the revised second-order draft and indeed had been invited to review the first order draft.
496	42270	25	28	26	0	27	It is unclear whether the loss of coal exports was temporary or permanent, or is the quoted range meant to capture that uncertainty? Some extra explanation woudl assist. (Adolf Stroombergen, Infometrics)	The lost revenue was in 2011, added "in that year" to make this clear.
497	51523	25	28	32	28	32	"high confidence" -- This term, as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	Done
498	51524	25	28	46	28	48	For this described projection, it would be helpful to provide greater detail. For example, what are the scenarios or assumptions for the projection, what is the primary driver of the projected increase, etc.? (Katharine Mach, IPCC WGII TSU)	The reasons for the different projections are now stated to the extent this can be done within page constraints.
499	49375	25	29	8	0	0	“electrical losses”. Explain? (Graeme Pearman, Monash University)	Clarified that these are electrical losses from transmission lines. The electrical loss increases with the square of the current being carried (though we felt that this is too detailed given space constraints).
500	51525	25	29	16	29	16	It would be helpful to clarify a bit further what is meant by "risk" on this line--risk of increased costs for repair, reduced functionality, inability to continue functioning, etc.? (Katharine Mach, IPCC WGII TSU)	The risk that has been assessed is the risk of failure; this entails costs of repair, but this was not the reason for the 'high risk' classification. Wording clarified and made consistent with the underlying assessments.
501	49376	25	29	17	0	0	Will the wider reader know what ACT stands for? Best in full. (Graeme Pearman, Monash University)	Wording changed to avoid the need to spell out individual States.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
502	49377	25	29	23	0	0	Considered by whom? (Graeme Pearman, Monash University)	Reworded to clarify that this is the conclusion of the cited studies.
503	42544	25	29	25	29	25	According to AECOM, the energy sector has high vulnerability to lightning, but there are few studies of the effect of climate change on lightning. Follow up with Donna.Lorenz@aecom.com (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We were not able to find any references making relevant projections of lightning changes with climate change over Australia and New Zealand. Hence we feel this is not sufficiently relevant, despite the high vulnerability to lightning strikes.
504	41785	25	29	27	30	26	Section 25.6.8 - This section is by far the most superior tourism sector chapter of all the regional chapters I have reviewed. It is concise and critical and encapsulates the most currentregionally specific literature. (Daniel Scott, University of Waterloo)	Thank you.
505	49378	25	29	29	29	37	Climate change or climate variability? (Graeme Pearman, Monash University)	It could be both, and we are deliberately not making a judgement here whether specific events could be attributed to climate change - they simply demonstrate the sensitivity to climate extremes, which in turn are projected to change with climate change.
506	41253	25	29	30	27	30	This section is well written and comprehensive and includes the most updated peer-reviewed literature for the region. (Stephen Turton, James Cook University)	Thank you.
507	49798	25	29	32	29	32	tourist locations is not a phrase used in any academic literature on tourism systems. I suggest replacing the term location with 'destination' as is the convention in tourism studies (for more information on tourism systems and nomenclature see Leiper, N. (2004). Tourism Management. Frenchs Forest, Pearson Education Australia. (Nadine Elizabeth White, Southern Cross University)	Accepted, changed to destination.
508	42545	25	29	46	29	46	Note forthcoming paper by Hopkins et al assesses skier preferences in Australia and New Zealand. Snow cover is only one factor influencing personal decisions. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Thanks, this paper has been included and text modified to note that the physical measure of snow cover is only one element that influences vulnerability.
509	44857	25	29	51	29	54	The number and types of studies refered to for the characterisation of tourism and climate change in alpine regions in Australia continues to be very limited and STILL surprinsingly restricted to ski tourism, which is not an accurate representation of the situation in these regions given what we now know. Other studies in this region suggest that non-ski and non-snow related tourism takes a much higher and immediate priority and economic concern for the region at large than ski tourism does (see Roman, C.E., Lynch, A.H., & Dominey-Howes, D. (2010). “Uncovering the Essence of the Climate Adaptation Problem - a Case Study of the Tourism Sector at Alpine Shire, Victoria, Australia”. Tourism and Hospitality Planning & Development, 7(3): 237-252). Impacts from adverse extreme events during key seasons for tourism in the Victorian Alps region are much higher in the summer months than in winter (see also Roman, C.E. (2010). On being adaptable: transformative lessons on climate change adaptation through problem-orientation. A case study of the tourism sector at Alpine Shire, Victoria Australia. Published Ph.D. Thesis. School of Geography and Environmental Science, Monash University, Melbourne Australia. Available at: http://arrow.monash.edu.au/hdl/1959.1/283678). (Carolina Adler, Swiss Federal Institute of Technology (ETH) Zurich)	The cited paper does not actually state clearly that summer is more of an issue than winter in general, as it mainly points to perceptions and decision making barriers of tourism operators and priorities for some individual operators. This section is concerned with modelled impacts, hence the comment doesn't really apply here. Roman et al is a useful citation though for barriers to adaptation and included there.
510	41788	25	30	2	0	0	The uncertainty of tourist behavioural response to climatic and climate is discussed in the review by Scott et al. (2012) International Tourism and Climate Change. Wiley Interdisciplinary Reviews – Climate Change, 3 (3), 213-232), as well as in detail by Gössling et al. (2012) Consumer Behaviour and Demand Response of Tourists to Climate Change. Annals of Tourism Research, 39 (1), 36-58, which could be used to support this important statement. (Daniel Scott, University of Waterloo)	Reference added, together with a forward reference to section 25.9.2 which discusses international flow-on effects, where behaviours are also and even more important.
511	37503	25	30	5	30	26	I am surprised that there is nothing specifically about the Great Barrier Reef in this section. Are there no adaptive measures being taken there yet? (Will Steffen, The Australian National University)	The GBRMPA reference is specifically about the Great Barrier Reef, which focus on strengthening resilience, as indicated in the text. We are not aware of any other published tourism-specific measures around the GBR. Wording modified slightly to better convey the link between ecosystem resilience and destination attractiveness, but space constraints do not allow us to elaborate in more detail on specific GBR strategies.
512	49379	25	30	7	30	10	Some mention should be made that adaptation in the tourism sector may relate as much to fuel prices in a carbon constrained world as to environmental changes. Some of this paragraph seems a little repetitive? (Graeme Pearman, Monash University)	This is reflected in Section 25.9.2, and a forward reference to this section is provided at the end of the second paragraph in this section.
513	41786	25	30	12	0	0	time suitable' for snowmaking is not a common indicator in the ski tourism literature and is problematic because 'time required' to produce adequate snow is not known or specified in this study. Therefore, we don't know whether a change will be problematic or not (it also depends when that time lost is). Suggest revising this sentence accordingly. (Daniel Scott, University of Waterloo)	Sentence has been revised and now offers a conclusion on the ability to maintain skiing conditions rather than snow-making ability per se. The time required for snow making was not assessed in this study.
514	51526	25	30	14	30	14	The author team may wish to clarify further what is meant by "worst year in 20" in the parentheses on this line, as it seems that the percentages given pertain to a gradual change over all years. (Katharine Mach, IPCC WGII TSU)	The sentence has been revised and hopefully is now clearer without referring to the difficult to understand 1-in-20 year measure.
515	49380	25	30	19	30	26	Could be a bit more on the remaining and very significant uncertainties around regional change, and how recognition of this needs to be part of the risk assessment and adaptation strategy. (Graeme Pearman, Monash University)	Text revised to emphasise the significant uncertainties in regional climate change projections.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
516	41787	25	30	22	0	24	A recent review of this literature identified other factors / barriers to adaptation, some of which were based on studies with tourism operators in this region. Consider reference to the broader discussion. Scott et al. (2012) International Tourism and Climate Change. Wiley Interdisciplinary Reviews – Climate Change, 3 (3), 213-232) (Daniel Scott, University of Waterloo)	We feel that the barriers highlighted so far are the most important ones and due to space limitatoins we are reluctant to add more to avoid a shopping list of barriers. We included the very recent Scott et al reference earlier, so anyone interested in tourism can follow up based on that.
517	49799	25	30	24	30	24	The FOD refers to lack of leadership but does not provide a reference. A reference you may choose to use here regarding lack of government leadership on climate change adaptation pertaining to the tourism industry in both Australia and New Zealand is a book chapter that is currently in press and due for release in late August 2012. The reference is White, N.E. and Buultjens, J. (2012 In Press) 'Climate change policy responses of Australia and New Zealand national governments: implications for sustainable tourism' in M.V. Reddy and K. Wilkes (Eds) Tourism, Climate Change and Sustainability. Oxford: Earthscan Publications Limited. If you wish I can send you a pre-press MS Word document of the chapter - just let me know by email. (Nadine Elizabeth White, Southern Cross University)	We moved the Turton reference to the end of the sentence, as it pretty much covers all of these barriers, including the lack of leadership, but added the suggested reference as well.
518	49800	25	30	26	30	26	I suggest continuing the final sentence of the tourism section with something along the lines of 'and unknown potential community responses to sharing increasingly limited contested resources, such as water, with tourists.' (Nadine Elizabeth White, Southern Cross University)	Added some more text to broaden the context and added a reference, also in response to an earlier comment.
519	49381	25	30	35	0	0	"will". Do we know for obesity? (Graeme Pearman, Monash University)	Reference to obesity deleted. Also, we added the citation of Howden-Chapman to specifically support the point about overcrowding.
520	41672	25	30	39	30	54	observed impacts but with very limited attribution. (Lourdes Tibig, The Manila Observatory)	We are not sure what the reivewer is requesting, if anything.
521	53581	25	30	46	30	46	How unusual is that temperature? (Kristie L. Ebi, IPCC WGII TSU)	Even in SE Australia this is significantly hotter than average. The text has been edited to remove the reference to any particular temperature: "record numbers of consecutive hot days in many locations".
522	42708	25	31	0	0	0	Human health; This section does not mention the possible increases in asthma and Allergic rhinitis. Approximately 17% of the Australian population suffers from hay fever. Admittedly, the evidence is not strong but given the proportion of people who are affected it is worth mentioning. There are some Australian studies that have demonstrated a significant change in flowering – the majority to earlier (see below). Earlier flowering could equate to an earlier start to the hayfever season. Gallagher RV, Hughes L, Leishman MR (2009) Phenological trends among Australian alpine species: using herbarium records to identify climate-change indicators. Australian Journal of Botany 57, 1-9. Green K (2010) Alpine taxa exhibit differing responses to climate warming in the Snowy Mountains of Australia. Journal of Mountain Science 7(2), 167-175. Keatley MR, Hudson IL (2012) Detecting change in an Australian flowering record: Comparisons of linear regression and CUSUM change point analysis. Austral Ecology. DOI: 10.1111/j.1442-9993.2011.02344.x MacGillivray F, Hudson IL, Lowe AJ (2010) Herbarium collections and photographic images: Alternative data sources for phenological research. In 'Phenological Research: Methods for environmental and climate change analysis.' (Eds IL Hudson and Keatley M.R) pp. 425-463. (Springer: Dordrecht) Rumpff L, Coates F, Morgan J (2010) Biological indicators of climate change: evidence from long-term flowering records of plants along the Victorian coast, Australia. Australian Journal of Botany 58, 428-439. (Marie Keatley, University of Melbourne)	We consider that there is only very weak evidence of health impacts associated with early flowering. While the phenological trends are well documented (and indeed included in section 25.6.1 and Table 25-3), their significance for health outcomes in Australasia remains conjecture and hence is not appropriate for the section on observed impacts.
523	39109	25	31	7	31	7	replace 'part so' with 'parts of' (Lynda Chambers, Australian Bureau of Meteorology)	Done
524	45146	25	31	8	0	0	Note recent refs from Huang, e.g. Huang, C., Barnett, A. G., Wang, X., and Tong, S. (2012). The impact of temperature on years of life lost in Brisbane, Australia. Nature Clim. Change 2, 265-270. and Huang, C., Barnett, A. G., Wang, X., Vaneckova, P., FitzGerald, G., and Tong, S. (2011). Projecting Future Heat-Related Mortality under Climate Change Scenarios: A Systematic Review. Environmental Health Perspectives 119, 1681-1690 (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	There is little about ANZ in the 2011 EHP paper, hence we did not cite this. But we have added a reference to Huang 2012.
525	42546	25	31	8	31	8	Need to be very clear about whether projected changes in heat-related deaths include or exclude demographic change. Delete "recent" since the 2008 study was done 4 years ago. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We agree. The text now clarifies the role of demographic change. Deleted "recent".
526	51527	25	31	8	31	11	For this example, it would be helpful to clarify the relevant climate/socio-economic scenario for the projection. In addition, could the ranges of additional deaths projected for 2070 and 2100 be provided, instead of just the central value of the estimate? (Katharine Mach, IPCC WGII TSU)	More details have been added, and numbers from a 450 ppm scenario added to contrast with A1FI.
527	39110	25	31	10	31	11	What is the base period assumed for 'relative to no climate change'? (Lynda Chambers, Australian Bureau of Meteorology)	The reference climate was 1990-2005. "after 2005" added.
528	39111	25	31	11	31	15	Suggest combining the last two sentences thereby making clearer what the 'substaintial increase' is. (Lynda Chambers, Australian Bureau of Meteorology)	Done (period replaced with colon)
529	49382	25	31	11	31	15	Is this for Australia or Australasia? Are the numbers in Line 15 correct in that they seem to imply a smaller impact that the Bambrick study? (Graeme Pearman, Monash University)	Neither -- it is for Sydney only. The impact is smaller than for Bambrick's nationwide study (dominated by Queensland), but greater than Bambrick found specifically for Sydney. No change to the text, which already stated "for Sydney".

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
530	42547	25	31	19	31	19	When does outdoor work become "impossible"? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	When WBGT>28C, according to the American College of Sports Medicine, as reported in Maloney & Forbes 2010. This specification now added.
531	39112	25	31	27	31	29	Suggest deleting as not new information and this was reported in equivalent chapter in WGII AR4. (Lynda Chambers, Australian Bureau of Meteorology)	Done
532	49383	25	31	31	31	36	All other things being held constant? (Graeme Pearman, Monash University)	Yes -- text changed accordingly
533	41514	25	31	38	0	0	Are you able to also make a (literature-based) assessment about whether or not dengue vectors could become established in parts of NZ under projected changes in climate ? (David Wratt, NIWA, New Zealand)	It is our expert assessment that there is not sufficient evidence to state that NZ will become climatically suitable for dengue (Hales 2002). We will consider stating this explicitly in the final government draft subject to checking any other relevant studies.
534	51528	25	31	39	31	42	If possible, it would be preferable to specify a bit further detail about the scenarios used, in terms of temperature increase by 2100 or other concise descriptors. (Katharine Mach, IPCC WGII TSU)	Scenario is now specified.
535	49384	25	31	47	31	48	Same argument for other diseases. (Graeme Pearman, Monash University)	Not to the same extent, since there is curative treatment available for malaria, but not for arboviruses (dengue, Ross River virus etc). This now noted in text.
536	49385	25	31	51	31	54	Sentence incomplete. (Graeme Pearman, Monash University)	Sentence has been revised and completed.
537	49386	25	32	1	33	54	There seems to be a lack of consideration of the wider issues of adaptation by all emergency services. It is not just about fire fighting services, but also, police, coroners office, health services, insurance, gas/electricity/water, etc. See for example: Pearman, GI and Hunter, J. (2009). Climate change and the fire and emergency services sector. Discussion paper prepared by Sustainability Works, for the Australasian Fire and Emergency Service Authorities Council, Melbourne. 28pp. (Graeme Pearman, Monash University)	Text edited to make more generally applicable (i.e. not just referring to heatwaves). suggested reference added
538	42548	25	32	11	32	11	Greening cities reduces the urban heat island effect, which in turn reduces heat-related deaths (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This now included.
539	37504	25	32	18	32	18	Remove comma after "Kiem et al., 2010)" (Will Steffen, The Australian National University)	Done
540	49387	25	32	21	0	0	“surge planning”? (Graeme Pearman, Monash University)	deleted
541	49388	25	32	30	0	0	“rapidly growing” with respect to what? (Graeme Pearman, Monash University)	Wording deleted
542	49389	25	32	33	0	0	“DNP” in references. Note absence of comma. (Graeme Pearman, Monash University)	These editorial issues will be addressed in the final government draft.
543	36441	25	33	0	0	0	it is interesting that the section on Maori is much more nuanced and less scripted by 'vulnerability' than much of the rest of the chapter. (Eric Pawson, University of Canterbury)	No change is suggested, nor has been taken. Differences in approach reflect the assessments of the authors and the nature of the avaialble literature.
544	49390	25	33	4	0	0	Don’t we all? (Graeme Pearman, Monash University)	Comment noted: no action required or taken.
545	35049	25	33	4	33	6	Make the point that although indigenous Australians only make up 2.5% of the population they own or control about 20% of the land. As the land sector makes up 23% of Australia's geenhouse gas emissions (Australian Government 2011) this provides adaptation and mitigation opportunities for indigenous people. Ref: Australian Government (2011) Carbon Credits (Carbon Farming Initiative) Regulations 2011, Draft 12 August 2011. Department of Climate Change and Energy Efficiency, Canberra. (David Griggs, Monash University)	This important point has been introduced into the opening paragraph of the section with the added reference.
546	35050	25	33	4	33	6	Make the following points. Much of the carbon stored in northern and inland Australia occurs on Indigenous-owned land (Heckbert et al. 2009). Many Aboriginal and Torres Strait Islander peoples are well situated to provide GHG abatement and carbon sequestration services (Robinson et al. 2011; Whitehead et al. 2009), and over a number of decades, Aboriginal and Torres Strait Islander natural resource management (NRM) institutions have built strong capacity for the provision of a range of ecosystem services (Altman et al. 2007; Whitehead et al. 2008). Aboriginal and Torres Strait Islander people’s participation in carbon markets has the potential to provide an avenue to pursue culturally appropriate activities that meet their local livelihood and economic development aspirations (Robinson et al. 2011, Whitehead et al. 2009). This includes ecosystem services for GHG abatement and carbon sequestration activities. Such activities broaden opportunities for Aboriginal and Torres Strait Islander peoples to work on ‘country’ , maintain a physical and spiritual connection to country, and grow their knowledge and practices for future generations by building on recent developments in ecosystem management initiatives (Hill et al. 2010; Robinson and Lane in press). (David Griggs, Monash University)	This point, supported by the Heckbert et al., Robinson et al. and Whitehead et al., references, has been iintroduced in a new paragraph of the second order draft.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
547	35051	25	33	4	33	6	Refs for above comment. 1. Heckbert, S., Davies, J., Cook, G., McIvor, J., Bastin, G. and Liedloff, A. (2009) Land management for emissions offsets on Indigenous lands, CSIRO Sustainable Ecosystems Technical Report, Darwin. 2. Robinson, CJ, Gerrard, E, Maclean, K, May, T. (2011). Australia's Indigenous Carbon Industry: A national snapshot, 2011. Report to RIRDC, Canberra. 3. Whitehead, P. J., P. Purdon, P. M. Cooke, J. Russell-Smith and S. Sutton (2009) The West Arnhem Land Fire Abatement (WALFA) project: the institutional environment and its implications. In: Russell-Smith J., Whitehead P. & Cooke P. (Eds.) Culture. Ecology and Economy of Fire Management in North Australian Savannas: Rekindling the Wurrk Tradition (date). CSIRO Publishing, Australia. 4. Altman, J., Buchanan, G., and Larson, L. (2007) The environmental significance of the Indigenous estate: natural resource management as economic development in remote Australia, Centre for Aboriginal Economic Policy Research Discussion Paper no 286/2007. The Australian National University, Canberra. 5. Whitehead, P. Purdon, P. Russell-Smith, J. Cook,G and Sutton, S. (2008) The management of climate change through prescribed savanna burning: emerging contributions of Indigenous people in northern Australia. Public Administration and Development 28, 374-385.6. Hill, R., Williams, K.J., Pert, P., Robinson, C.J., Dale, A.P., Westcott, D.A. Grace, R., and O'Malley, T (2010) Effective community-based natural resource management for biodiversity conservation in Australia's tropical rainforests. Environmental Conservation 37(1), 73-82. 7. Robinson, CJ and Lane, MB., Boundary riding - Indigenous people, knowledge and environmental planning in northern Australian landscapes, in B. Walker, D. Natcher, T. Jojola, and T. Kingi (date), Walking backwards into the future. Indigenous approaches to community and land-use planning in the twenty-first century. McGill-Queen's University Press. (David Griggs, Monash University)	This point, supported by the Heckbert et al., Robinson et al. and Whitehead et al., references, has been iintroduced in a new paragraph of the second order draft.
548	35052	25	33	6	33	8	Not only are indigenous observations starting to be used but cultural mapping exercises are starting to capture indigenous knowledge and practices and to combine that information with conventional forms of knowledge to imptove land and water management. Ref: Lynch, A.H, D.J. Griggs, L. Joachim and J Walker, 2012 Indigenous voices in climate change adaptation: the challenges facing the Yorta Yorta of Australia Journal of the Policy Sciences, in press. (David Griggs, Monash University)	Noted and modification made to the final paragraph of the Section
549	39113	25	33	22	33	23	Large number of references, consider reducing, particularly as more detail is given in subsequent sentences (with associated references). (Lynda Chambers, Australian Bureau of Meteorology)	Rationalisation of the references used has been made wherever possible. Some have been removed for succinctness.
550	51529	25	33	27	33	27	"likely" -- If this term is being used as calibrated uncertainty language, it should be italicized. Otherwise, the author team should avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	Alternate wording has been used in the re-draft.
551	39114	25	33	39	33	40	Consider reducing number of references (Lynda Chambers, Australian Bureau of Meteorology)	Rationalisation of the references used has been made wherever possible. Some have been removed for succinctness.
552	42305	25	33	42	33	42	The Māori impact section is excellent and a step up from AR4. See the earlier comments about impact on tītī (sooty sheatwater) harvests. This is an iconic, culturally defining activity of Rakiura Māori that impacts on the economy, knowledge transfer, kinship and social networks of an entire community. I can supply several references for these links if wanted, but again the link to CC is logical and there are proven links to ENSO and PDO, but not yet a projection about whether the latter are becoming more frequent and/or intense. (Henrik Moller, University of Otago)	Thank you for the positive comment. Given space constraints we belive our general comment on the importance of climate-driven shifts in natural ecosystems captures a range of issues such as possible impacts on titi and other key species in Māori life.
553	42271	25	33	49	0	50	"Inequalities in political representation" is an emotve and unsubstantiated assertion. I recommend it be removed. With dedicated Maori seats in Parliament, Maori actually have more opportunity for political representation than others people. (Adolf Stroombergen, Infometrics)	This comments is well-taken and the sentence has been removed.
554	49391	25	34	7	0	0	Avoids the reality that Indigenous people are heavily linked to burning through cultural practices. (Graeme Pearman, Monash University)	This is not directly relevant to climate change impact and adaptation to fire. The biggest likely impact and adaptation needs are in south-west and south-east Australia.
555	49392	25	34	9	34	13	Seems repetitive from earlier text. (Graeme Pearman, Monash University)	This sentence describes the substantial damages that can be caused by fire, and is important to set the context for this box. There are no similar statements elsewhere in Chapter 25.
556	42549	25	34	11	34	11	The fires cost about $4 billion (VBRC, 2010). This occurred toward the end of a drought that lasted 13 years. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Okay. Sentence has been revised to reflect this.
557	40634	25	34	24	34	30	For an example that takes into account the interaction between changes in fire weather and changes in fuel loads, see King et al (currently online-early in the International Journal of Wildland Fire). (Andrew Moore, CSIRO)	The King et al. reference, which is a more recent reference, has been added.
558	37505	25	34	29	34	29	Does the statement in this line take into account the water use efficiency effect of CO2? (that it will allow more photosynthesis for a given amount of water use) (Will Steffen, The Australian National University)	Yes - enhanced fuel load from higher vegetation biomass is likely where water limitations exist, but this will not offset water limitations indefinitely – in areas of severe water scarcity enhanced CO2 will not completely offset this. The wording has been revised in the SOD to address this point, but we will further consult with relevant experts to further improve on this wording in the final government draft.
559	42709	25	34	42	34	44	does not mention the impact of fire on potable water supplies. A reference for this is Smith H G , Sheridan GJ, Lane PNJ., Nyman P, Haydon S (2011) Wildfire effects on water quality in forest catchments: A review with implications for water supply. Journal of Hydrology 396, 170–192 (Marie Keatley, University of Melbourne)	Okay. Reference added and revised text mentions fire impact on water quality in water supply catchments.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
560	42550	25	34	48	34	48	Is there much evidence that there is avoidance of development in high fire risk areas? There is lots of evidence to the contrary, e.g. rebuilding in areas that have been devastated by fire. Disincentives are not large enough to change behaviour. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The reference to 'avoidance of development in high fire risk areas' has been removed. There are papers in the literature that discuss this, but there is little evidence yet of practice or initiative to avoid development in high fire risk areas (in response to climate change).
561	53582	25	35	8	35	29	Are there any issues with affordability? (Kristie L. Ebi, IPCC WGII TSU)	The current text already makes it clear that there are affordability issues. Added reference NDIR, 2011.
562	42551	25	35	11	35	13	Is it possible to include a time series of major insurance claims? How do floods and storms compare with fires and earthquakes? Any comment about levels of under-insurance, and disincentives for insurance when governments (and private donations) provide emergency relief? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	We do not feel that a time series would be robust enough due to inconsistencies in data collection, changing building standards and other risk mitigation options, and the generally short record. We added a statement about Oceania-wide trends in the absolute number of damaging events.
563	41515	25	35	14	0	0	I suggest you add a sentence explaining whether there has (or has not) been any attribution of this increase in "damaging insured events" to either or both of (i) increased investment in buildings etc in vulnerable areas (e.g. on the coast) or (ii) changes in climate . Also, is the increase referred to an increase in the frequency of events, or an increase in the average costs of events, or a combination of both ? (David Wratt, NIWA, New Zealand)	There is little literature on this. We added a sentence stating that the absolute number of damaging events has increased in the Oceania region, but that the only published study on climate change attribution has found no climate-related trend in Australia.
564	48703	25	35	15	35	15	Is the increase in damage in Schuster Ref specific to Australia or NZ or both or a generic global finding? (Robert Bell, NIWA)	It captures the Oceania Region, clarified in text.
565	43117	25	35	17	35	19	This has already happened. So, Suncorp have withdrawn insurance for flood cover at Emerald and Roma in Queensland. I can't give a reference, but a look through archives of The Australian will bring it to light. Of interest is the underlying reason - it's not to do with risk per se, but with action by the government. Thus, cover has not been removed in Charleville, which has been worse hit by flooding, but which has levees (even if they aren't much good). The insurance company is trying to push the government into action to build defences. (Jean Palutikof, Griffith University)	Restriction of cover is now stated in the text, but we do not consider there to be adequate literature to give reasons why this has occurred. Note that it is only restriction of cover, not plain removal.
566	45147	25	35	18	0	0	Note there are recent examples of insurance refusal/pricing out - (http://insuranceandrisk.com.au/476a20bf/Suncorp%20urges%20better%20flood%20mitigation%20for%20Roma%20and%20Emerald; http://www.aph.gov.au/Parliamentary_Business/Committees/House_of_Representatives_Committees?url=spla/strata/report.htm; and recent Queensland Floods Commission of Inquiry 2012. (cited in CSIRO submission Jun 2012 to Productivity Commission Draft Report) (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Restriction of cover is now stated in the text, and issues around affordability are already covered.
567	42552	25	35	35	35	35	This Box largely duplicates previous text, except for residential buildings. It doesn't mention anything about transport, telecommunications or critical infrastructure. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The box has been revised fundamentally to reflect this and other comments, with a focus on adaptation needs, options and challenges. Specific options are covered in a new table. Infrastructure needs are now mentioned specifically in the new text.
568	45148	25	35	39	0	0	See also Huang, C., Barnett, A. G., Wang, X., and Tong, S. (2012). The impact of temperature on years of life lost in Brisbane, Australia. Nature Clim. Change 2, 265-270 (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	This reference now cited in section 25.9.1.
569	45149	25	36	9	0	0	Note also Wang et al 2010b's conclusion that stanards such as energy star ratings are currently defined using algorithms which mean the ratings of a given building will change with climate change, requiring policy change. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	The box has been revised fundamentally and this comment is no longer directly applicable.
570	49393	25	36	32	36	35	Here again the emphasis on mean sea-level rise is unfortunate. (Graeme Pearman, Monash University)	The box has been revised fundamentally and this comment is no longer directly applicable.
571	35532	25	36	36	36	37	Overheating and energy demand of buildings can be reduced by down-sizing in terms of dwelling units. Also during the cold months of the years in cities such as Melbourne there is a practice for some eating establishments to have outdoor heaters which are extremely energy inefficient. (Hans Baer, University of Melbourne)	The first point is covered implicitly in the new table, but there is little literature specific to overheating and size. Energy demand per se is not within the mandate for this chapter (unless the reviewer intended to the benefit of a warming climate that might reduce the use of outdoor heaters - but that would be pure conjecture with no supporting literature about behavioural change.)
572	49394	25	36	42	36	43	This statement has much wider applicability. (Graeme Pearman, Monash University)	This has now been shifted to the section on interactions where it is being given greater prominence (i.e. Deferral of adaptation not necessarily being one that reduces costs or increases flexibility).
573	45150	25	37	3	0	0	I think this is physical damages only, with substantial econmic disruption (e.g. Mine closures, etc) on top of this. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	The 'in excess of AUD$2 billion' is an estimate and it includes more than infrastructure damages - it is difficult to quantify all types of damages in economic terms. The use of the word 'damages' makes it clear that this is not the overall economic cost of the floods (e.g. from lost revenue due to mine closures - which is covered in 25.7.3).

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
574	41135	25	37	3	37	4	"These floods were associated with a strong monsoon and the strongest La Nina on record..." See also paper by [Evans, J.P. & Boyer-Souchet, I., 2012, "Local sea surface temperature add to extreme precipitation in northeast Australia during La Nina", Geophysical Research Letters, Vo. 39, L10803.] (Seth Westra, University of Adelaide)	This useful reference is now included.
575	42306	25	37	4	37	6	The all consuming impact of ENSO again. So is the impact of ENSO on floods demonstrated (or was 2011 a chance event with respect to its putative link to ENSO?) and once the ENSO effect has been accounted for, is there evidence for long term trend in flooding ie. within different phases of ENSO). (Henrik Moller, University of Otago)	This sentence states that the 2010-2011 Queensland flood is associated with a strong monsoon and strongest La Nina on record. This is not a prediction of what might happen in the future as there is insufficient literature to support this (see 25.2).
576	41136	25	37	5	37	6	"Floods exhibit strong decadal variability and there is no significant long-term trend to date in their frequency and severity." See also [Ishak, E.H., Rahman, A., Westra, S., Sharma, A. & Kuczera, G., 2010, "Preliminary analysis of trends in Asutralian flood data", World Environmental and Water Resources Congress, American Society of Civil Engineers (ASCE), 16-20 May 2010, Providence, Rhode Island, USA.]. An updated version of this work has been submitted to the Journal of Hydrology [Ishak, E.H., Rahman, A., Westra, S., Sharma, A. & Kuczera, G., On Hydrologic Stationarity: A Trend Assessment of Austrailan Annual Maximum Flood Data, submitted to Journal of Hydrology]. The general conclusion is that floods in the southern parts of Australia have exhibited a statistically significant decrease, although it is not possible to attribute this to anthropogenic climate change or to low-frequency variability. In either case this study does not find evidence for the statement that flood risk is increasing, which appears to be implied in many sections of the IPCC report. (Seth Westra, University of Adelaide)	The Ishak et al. reference is now included. The sentence here states that floods exhibit strong decadal variability and there is no significant long-term trend to date in thier frequency and severity - as pointed out in this review comment.
577	49395	25	37	9	0	0	"Griffiths" is missing in the references. (Graeme Pearman, Monash University)	Griffiths 2007 is in the reference list.
578	39115	25	37	10	37	11	Consider reducing number of references (Lynda Chambers, Australian Bureau of Meteorology)	Agree. Two references have been removed and list of (similar) references several lines below has been deleted.
579	41137	25	37	15	37	16	"In Australia, flood risk is expected to increase more in the north (which is driven by convective rainfall systems) than in the south (where mean rainfall is projected to decline)..." It is unclear whether the authors are concluding that flood risk is expected to increase in the north *because* the rainfall is driven by convective systems which are more vulnerable to changes in atmospheric temperature. Note that [Westra., S. & Sisson, S.A., 2011, "Detection of non-stationarity in precipitation extremes using a max-stable process model", Journal of Hydrology, 46(1-2), doi: 10.1016/j.jhydrol.2011.06.014] and [Jakob, D., Karoly, D.J. & Seed, A., 2011, Non-stationarity in daily and sub-daily intense rainfall - Part 2: Regional assessment for sites in south-east Australia, Natural Hazards and Earth Systems Science, 11, 2273-2284] both find stronger increases at very short (hourly or sub-hourly) timescales, and [Hardwick-Jones, R., Westra, S. & Sharma, A., 2010, Observed relationships between extreme sub-daily precipitation, surface temperature and relative humidity, Geophysical Reseach Letters, 37 (L22805)] also shows more temperature sensitivity at short timescales. Therefore this evidence is consistent with the link between flood risk and convective rainfall, although the link still needs to be made more explicitly. (Seth Westra, University of Adelaide)	We agree with the comments. The text (in Box 25-9 in SOD) now states that "flood risk is projected to increase in many regions due to more intense rainfall events driven by a warmer and wetter atmosphere". We then say that "in Australia, flood risk is expected to increase more in the north (which is driven by convective rainfall systems) than in the south (where increased flood risk from more intense extreme rainfall may be compensated by drier antecedent moisture conditions". The additional references provided in the review comments are useful, and most of them are included in the SOD (Table 25-1) in reporting observed trends in and climate change impact on rainfall extremes.
580	41138	25	37	15	37	16	"In Australia, flood risk is expected to increase more in the north (which is driven by convective rainfall systems) than in the south (where mean rainfall is projected to decline)..." This statement implies that flood risk in the south is still expected to increase, but to a lesser extent than in the north. However based on some of the evidence I have presented in other comments, it is still unclear whether flood risk will increase or decrease in the south. Therefore this statement should be reworded to emphasise uncertainty about the sign of change in the south. Note also that [Pathiraja, S., Westra, S. & Sharma, A., "Antecedent Moisture in Design Flood Estimation: The Need for Continuous Simulation.", Water Resources Research, 48, W06534, doi: 10.1029/2011WR010997] show an important role of catchment wetness prior to the flood in determining the flood magnitude. Thus in regions where mean rainfall is projected to decline and evapotranspiration is projected to increase, the flood risk might still decline *even if* extreme rainfall increases. (Seth Westra, University of Adelaide)	This statement is based on predictions/projections of rainfall extremes, as reported in the references and discussed in Section 25.2 and Tavle 25-1 (and not on trends in observations, which are also discussed in Table 25-1).
581	41139	25	37	20	37	20	"Flood risk near river mouths will be exacerbated by higher storm surge and potential changes in wind speeds." Note in page 9 line 43 the report concludes that changes in storms produce a secondary effect and the largest effect is the change in mean sea level. Thus presumably flood risk near river mouths will be most sensitive to changes in mean sea level. Note that I am currently preparing a manuscript on the joint probability between extreme rainfall and storm surge in the coastal zone, which will be submitted in the coming weeks - this can be made available on request. (Seth Westra, University of Adelaide)	The text is now more precise - 'storm surge associated with higher sea level'.
582	45151	25	37	24	0	0	remove 'in' from 'infilling' - I think filling with water rather than sediment is meant (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Yes - removed 'in' from 'infilling'.
583	42710	25	37	24	37	25	The Hughes 2003 reference is a review it would be better to cite the original papers. However, moderate flooding also has benefits through infilling reservoirs, recharging groundwater and replenishing natural environments (Chiew and Prosser, 2011; Hughes, 2003; Oliver and Webster, 2011) (Marie Keatley, University of Melbourne)	The Hughes reference has been removed - the other two references are sufficient.
584	45152	25	37	27	0	0	Is actual exposure of buildings decreasing, thgouh? Probably not, thgouh there is poor evidence here - in the UK the Cimate Adaptation Sub-committee's report in 2011 shows that numbers of houses in flood exposed areas is actually increasing. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	This sentence stating that adaptation to incresed flood risk is 'starting to happen' (changed from 'already happening') is appropriate - followed by examples and references in subsequent sentences.
585	43118	25	37	30	37	30	What is very interesting about the relocation at Grantham is that in none of the paperwork or statements is there any mention of climate change - very likely this was deliberate to avoid alienating the rural community in which the relocation took place. (Jean Palutikof, Griffith University)	Okay. No change required. Text is appropriate.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
586	49396	25	37	31	0	0	Might include temporary storage. (Graeme Pearman, Monash University)	The last sentence in the second last paragraph of Box 25.9 on 'retaining floodplains and floodways and retrofitting existing systems to attenuate flows' provides sufficient examples of storages to attenuate flows.
587	49397	25	37	37	0	0	Strange referencing? (Graeme Pearman, Monash University)	Referencing has been made concistent in SOD.
588	48938	25	37	43	0	0	section 25.7 interactions between impacts etc - I wonder whether it is worth noting that Australia agriculture has to adapt to, not just individual extremes, but also sequences of different types of extremes (droughts and flooding rains) - which raises unique sets of challenges - not just for the primary producer but also for co-ordination of preparedness planning across different response agencies (Leon Soste, Department of Primary Industries, Victoria, Australia)	This has been taken up as emerging risk in the synthesis and conclusions section, based on similar comment by another reviewer. However, due to lack of literature specific to agriculture, we do not specifically point out agriculture as this type of risk cuts across sectors.
589	39116	25	38	0	0	0	Table 25-4 and Table 25-5 have the same structure and could potentially be combined. (Lynda Chambers, Australian Bureau of Meteorology)	Yes, but we don't see great advantage in combining the two tables and in fact this could result in confusion.
590	49398	25	38	1	38	54	A classic example of interactions is for motor vehicle futures, where cost of fuels, balance of payments, security of supply, health related emissions, greenhouse-gas emissions, manufacturing employment, and the provision of mobility are all factors that need to be considered simultaneously. Not easy for governments. (Graeme Pearman, Monash University)	The comment is correct, but not clear what change is requested or would be appropriate here. Most of those dimensions fall outside the mandate for WGII to consider, as none of the issues are strongly related to climate change impacts and/or adaptation, but all to mitigation and the co-benefits of mitigation.
591	37506	25	38	2	38	3	The message in these two lines is very important and could be included in the executive su mmary (Will Steffen, The Australian National University)	We agree with the reviewer that this is an important issue but feel that the chapter and indeed the literature does not inlcude consistent enough examples across sectors to jusitfy it appearing as a generic conclusion in the ES. Some studies and reports suggest that a focus on reducing near-term vulnerability is appropriate, and we need to avoid creating overly simplistic conclusions.
592	40635	25	38	30	39	15	For the information of the authors: a major review of interactions between climate mitigation actions in the land sector and biodiversity (C. Bradshaw &~30 et al) will be submitted shortly to Biological Conservation (Andrew Moore, CSIRO)	Thank you, manuscript has been obtained from the lead author. This is a useful reference, and is now cited in Box 25.10 and Table 25.5.
593	53583	25	38	32	38	35	Please provide the evidence for the confidence statements. (Kristie L. Ebi, IPCC WGII TSU)	The evidence is in the range of references cited in this box. However, given that this was only intended as a broad introductory statement, the confidence statement has been deleted and wording modified.
594	49399	25	38	46	0	0	Suggest “scale of carbon sequestration-driven..”. (Graeme Pearman, Monash University)	Unnecessarily wordy, it is clear from the context that sequestration refers to carbon sequestration.
595	49400	25	39	5	39	13	Note earlier comment about the physical limitations to biofuels that are currently poorly appreciated in business and government circles. It would be a pity if by exclusion, this document reinforces what is currently largely a myth. (Graeme Pearman, Monash University)	Wording revised that supports the notion that the potential from biofuels might be limited for a range of reasons.
596	51530	25	39	23	39	24	For this projection, it would be preferable to indicate, as possible, the corresponding climate/socio-economic scenarios evaluated. (Katharine Mach, IPCC WGII TSU)	Scenario is now specified.
597	41516	25	39	51	0	0	Is there really no literature on potential migration from low-lying Pacific Islands to NZ under some of the potential sea-level rise scenarios for the coming century ? (David Wratt, NIWA, New Zealand)	This issue is now considered in the text to the extent that the literature allows. There is plenty of conjecture about the importance and scale of migration but little substance that considers relevant other factors that affect actual migration.
598	49401	25	40	12	0	0	Suggest “Potential impacts on the economy pose...”. (Graeme Pearman, Monash University)	Sentence deleted to help meet page constraints.
599	49402	25	40	17	40	23	Should you indicate a level of confidence in these statements? (Graeme Pearman, Monash University)	We don't feel a simple confidence statement is helpful or possible here, given that the results are from a single albeit highly complex study. The level of confidence is better spelt out through the full text and commentary provided in this para.
600	49403	25	40	19	0	0	“550 ppm”, note space. (Graeme Pearman, Monash University)	Done
601	37507	25	40	25	40	36	This is a very interesting paragraph in that it shows the importance of potential impact studies in informing the degree of mitigation required. This may be a better use for Impact studies than in informing adaptation approaches. (Will Steffen, The Australian National University)	Noted, thank you. No change requested.
602	49404	25	40	30	0	0	Differences exist between those who are resource users and resource takers. (Graeme Pearman, Monash University)	Relevance and intent of comment not clear, no change made.
603	49405	25	40	42	0	0	Cost that are un-assessable/immeasurable? (Graeme Pearman, Monash University)	Paragraph has been deleted due to space reasons and because this message also is made clear in the following section.
604	41517	25	40	47	0	0	"The AR4 concludd with ...". I think these words should read: "The Australia and New Zealand Chapter of the AR4 concluded with ..." ? (David Wratt, NIWA, New Zealand)	Accepted and changed.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
605	48939	25	40	51	0	0	table 25-6, suggest include the effects of expected climatic extremes (both high temperatures and high r/f intensities) on agriculture - not just the risk from expected severe (average) drying. Relates also to discussion - p41, line 17 (Leon Soste, Department of Primary Industries, Victoria, Australia)	Added heat extreme icon for agriculture; the evidence is less strong and overall impacts less severe from increased heavy rainall.
606	48940	25	41	22	41	26	positive consequences' - may wish to consider the potential for increased large scale, distributed solar power generation in areas of inland Australia which have high levels of insolation and are close to the national grid (Leon Soste, Department of Primary Industries, Victoria, Australia)	There is little evidence that climate change will substantially increase the undoubtedly large solar potential (see Crook et al 2011, cited in 25.7.4). It is the mitigation side that will make solar power more attractive, but this is not within the mandate of this chapter.
607	42307	25	41	28	41	35	See my overall comment #3 for my general scepticism about this assertion. Should you retain the conclusion, at the very least I urge you to clarify whether there is real evidence of a difference in impact/vulnerability on the same dimensions (ie. where impacts on the same components of the social-ecological systems are available) on both sides of the Tasman. (Henrik Moller, University of Otago)	The direct comparison has been deleted based on this and similar comments.
608	49406	25	41	28	41	35	Indeed, one of the weaknesses of this analysis is how dependent NZ and Australia will be on changing international conditions such as demand for fuels, and food, environmentally motivated migration, enforced trade barriers, etc. (Graeme Pearman, Monash University)	The direct comparison has been deleted. The issue of flow-on effects is highlighted as key uncertainty in the concluding section.
609	42553	25	41	29	41	29	Page 43 line 33 says "ecosystems, agricultural production and urban infrastructure", but here it says "ecosystems, water resources and agriculture". Need consistency. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The direct comparison has been deleted due to a range of review comments querying the robustness of this comparison.
610	51531	25	41	32	41	33	"high agreement" -- If this term is being used as calibrated uncertainty language, it should be italicized. Otherwise, it would be preferable to avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	The assessment of the vulnerability of Australia compared with other countries has been deleted due to concerns by reviewers (and authors) about the basis for this statement.
611	42554	25	41	33	41	33	It's a big call to claim Australia is the most vulnerable developed country. By what metrics? To what extent does this depend on the direction of rainfall change? There may be other Mediterranean countries that are at least as vulnerable, especially when adaptive capacity is considered. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	The assessment of the vulnerability of Australia compared to other countries has been deleted due to concerns by reviewers (and authors) about the basis for this statement.
612	45153	25	41	38	0	0	This section lacks comment on the integrated or emergent national benefits of adaptation; this may come in multiple ways and some will be brought out in the emerging CSIRO/DCCEE work noted at p.12, l.49 (Schandl et al). (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	We have not found sufficient literature to make an assessment of the national benefits of adaptation. The work by Schandl et al does provide a useful first-pass national comparison of vulnerabilities and is now cited in the chapter (milestone report by Baynes et al), but no work was available in time for the SOD to go beyond this.
613	41481	25	41	40	41	42	Consistency in terminology: refer to constraints instead of barriers (Johanna Mustelin, Griffith University)	Yes, corrected.
614	54534	25	41	48	0	0	Section 25.8.2: I very much like the synthesis that has been done in this section, culminating in Table 25-6. In addition to the related comment I made on the Executive Summary presentation of this material, which has implications for revisions here, I would also suggest that you work to include further explanation in the text of the evidence and judgments that underly the color bars in the figure and particularly the potential for adaptation to moderate or delay certain impacts. Right now, their basis is not completely clear. As I have suggested above, providing further information summarizing the adaptation options available to moderate or delay certain impacts, and the potential for mitigation to reduce or delay the magnitude of impacts, would be very useful here. (Michael Mastrandrea, IPCC WGII TSU)	Additional commentary on the selection of key risks has been included in 25.10.2, and also 25.10.3 to provide additional detail on the potential (and nature) of adaptation to reduce risks for the key risks. Also wording in the table on adaptation issues has been expanded.
615	49407	25	41	51	0	0	Translocation of species is not the same as provision or maintenance of ecosystem function. (Graeme Pearman, Monash University)	No, but we're not saying that it is. We are saying that maintaining ecosystem function may require acceptance that "introduced" species have to become part of the transformed ecosystems, and indeed help drive this transformation.
616	48042	25	42	0	0	0	Overall a thorough and balanced/objective treatment of the literature on freshwater resources and ecosystems. There are a number of recent references that would be worth including from a recent issue of Marine and Freshwater Research that add further weight to some of the general observations, as wella s providing more specific information in the form of quantitative predictions (e.g. via SDMs) and a broad regional treatment of freshwater ecosystems (e.g. Morrongiello et al.). Morrongiello, J. R., S. J. Beatty, J. C. Bennett, D. A. Crook, D. N. E. N. Ikedife, M. J. Kennard, undefined author, M. Lintermans, undefined author, B. J. Pusey, and T. Rayner. 2011. Climate change and its implications for Australia's freshwater fish. Marine and Freshwater Research 62:1082. (Nick Bond, Griffith University)	Thank you. This reference is now included in several places in the revised text.
617	48941	25	42	1	42	15	suggest that this incremental / transformational challenge highlights the need for the development of guidelines on robust decision making under on-going uncertainty for a range of actors including policy makers, primary producers and others - particularly in the context of 'persistent uncertainty & incomplete understanding of vulnerability / adaptive capacity' (14/15) (Leon Soste, Department of Primary Industries, Victoria, Australia)	This thought has been incorporated in the revised section on knowledge gaps and research needs. It is a gap rather than a finding about what we know.
618	45154	25	42	7	0	0	This PC (2012) citation is misleading - the draft fails to deal well with path dependency as many critiques have pointed out; the final report may be better but otherwise I'd omit that ref. (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Reference to Productivity Commission has been removed, pending release and assessment of the final report.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
619	48041	25	42	21	0	0	I think the uncertainties and knowledge gaps (and hence research needs) could be emphasised more strongly. For example, in my area of expertise (freshwater ecosystems) there are huge uncertainties around surface-groundwater interactions and how that will affect river flows and persistence of refuges. Particularly in arid zone rivers - e.g. see some of the work Justin Costelloe on the uncertainties in dealing with the historic situation alone. THese unertainties will not be easy to overcome, and hence our ability to forecast change in these systems will continue to be a challenge. There are no doubt productive avenues of research to pursue that may warrant mention. (Nick Bond, Griffith University)	The assessment is not geared up to undertake a comprehensive assessment of knowledge gaps and research needs. Authors wish to avoid a shopping list of research needs and hence have strived to focus on high level priorities that are linked with adaptation decision-making practice.
620	42555	25	42	21	42	21	A cross-cutting uncertainty stems from emission scenarios and climate model reliability. Uncertainty about projected changes in storms has major implications for disaster risk management. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Partially accepted. Climate model reliability is outside the assessment scope of WGII. Uncertainty about storms is now mentioned, as is the importance of exploring alternative scenarios.
621	41518	25	42	21	43	5	In my view, information about how ocean chemistry (especially pH and carbonate chemistry) is varying in the seas surrounding Australasia, and knowledge about the vulnerability of our ocean and coastal species and ecosystems to projected changes in pH, is also a key gap. (David Wratt, NIWA, New Zealand)	Accepted, we now include changes in ocean pH in the discussion of uncertainties relevant for ecosystems.
622	49408	25	42	28	0	0	The focus on rainfall is unfortunate as it is really the resulting hydrology that is important. Certainly rainfall is a major factor. (Graeme Pearman, Monash University)	Reference to hydrology (and the fact that changes in rainfall can be amplified for hydrology) is now included.
623	48942	25	42	28	42	29	Relates to the above comment - narrowing the range of rainfall projections (ie reducing uncertainty) is a legitimate approach, but not the only one - the alternative is recognising that high levels of uncertainty are likely to persist and we need to develop strategies for dealing with on-going uncertainty (Leon Soste, Department of Primary Industries, Victoria, Australia)	A clear statement on the importance but also challenges associated with adaptive decision making has been included in the revised section.
624	49409	25	42	39	0	0	“limited” In the view of the reviewer this is a major understatement. We know so little about the genetics, the behaviours and the interactions of whole ecosystems, that it remains the greatest risk; we have underestimated how sensitive ecosystems are to even the smallest of changes over time. (Graeme Pearman, Monash University)	Changed to "very limited".
625	36442	25	42	45	49	0	this is a useful comment, but begs the question (see Wilson and Solnit refs above) as to whether the biophysical frame of reference, into which the social dimensions should be integrated, is the most illuminating way to cast the analysis. (Eric Pawson, University of Canterbury)	The phrase "integrated with" does not imply that one frame is necessarily dominant - the connections are mutual. The vulnerability framework and predominance of bio-physical studies in our assessment overall reflects the bulk of the literature, which forms the basis for our assessment.
626	48943	25	42	46	42	48	research into psychological, social, cultural .. poorly integrated with biophysical impact studies - agree entirely - suggest that, the need for such research integration could also incorporate economic implications assessment which picks up not only regional impacts of change, but also implications of change in the international arena (p42, lines 1-5). At a personal level - I would like to take that one step further and incorporate the concept of transdisciplinarity (Weik & Walter, European Journal of Operational Research, Volume 197, Issue 1, 16 August 2009, Pages 360-370) which adds the perspectives and knowledge of on-ground stakeholders to an interdisciplinary approach. (Leon Soste, Department of Primary Industries, Victoria, Australia)	Economics is part of social sciences, hence no change made on this particular point.
627	37508	25	42	51	42	51	Remove comma after "of the community" (Will Steffen, The Australian National University)	Sentence has been revised so comment no longer relevant.
628	49410	25	42	52	0	0	Is this too optimistic given the signs of a slowing of research investment in adaptation in Australia? (Graeme Pearman, Monash University)	It's a factually true statement for the past and the literature that has been generated by it; we're not making a prediction of long-term future trends.
629	39117	25	43	0	0	0	Frequently Asked Questions: there is a lot over overlap with the Executive Summary, particularly for questions 1 and 2. FAQ 25-3 also has over lap with FAQ 25-1 (e.g. lines 6-11). (Lynda Chambers, Australian Bureau of Meteorology)	FAQs have been revised and restructured fundamentally based on further discussions within WGII and instructions from the TSU.
630	41482	25	43	1	43	5	It is somewhat unclear what the point is in this paragraph. What exactly are these flow-on effects from international to local, what does this mean in terms of national or local adaptation/mitigation action? What are 'some economically important sectors' in this case in Australasia? What studies are considered here? (Johanna Mustelin, Griffith University)	Wording has been revised and extended to make the intention clearer.
631	42556	25	43	8	43	8	None of these FAQs have confidence statements. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	This is consistent with guidance from the TSU that FAQs should be easily accessible to the average reader. The FAQs have been revised so as to reduce the risk of inconsistency with the main text in the subject matter that they discuss.
632	41528	25	43	30	0	0	No mention of observed changes in coastal or open ocean. See references in New Zealand Aquatic Environment and Biodiversity Annual Review 2011. Chapter 6. MAF Publication. Available on http://fs.fish.govt.nz/Doc/22982/AE%20%20B%20Annual%20Review%202011.pdf.ashx (Mary Livingston, Ministry for Primary Industries)	FAQ has been deleted, comment no longer relevant.
633	43120	25	43	31	43	52	I'd have liked to have some sense of timing in this FAQ. Are you able to give some sense of when these impacts might become an important factor in planning? Is it tomorrow? Or decades away? Although ocean acidification is included as a factor in talking about the GBR, I didn't see any mention of direct CO2 effects when talking about the MDB agriculture - isn't that a factor? All in all, I found the answer to this FAQ over simplistic - even taking into account length constraints it should be possible to make it more informative and more interesting - maybe learning from the presentation of the eight key risks in the Executive Summary. (Jean Palutikof, Griffith University)	FAQ has been deleted, comment no longer relevant.
634	37509	25	43	31	44	28	There seems to be quite a bit of duplication in FAQ 25-2 and FAQ 25.3 (Will Steffen, The Australian National University)	FAQs have been deleted and/or substantially revised, comment no longer relevant.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
635	41483	25	43	32	43	34	This is self-evident that 'Climate change will affect many sectors'. Consider moving this paragraph and rewording around the statement whether Australia is more vulnerable than New Zealand (also in the introduction to the chapter). (Johanna Mustelin, Griffith University)	FAQ has been deleted, comment no longer relevant.
636	41529	25	43	34	0	0	While the changes expected in NZ are perhaps less extreme than Australia, it should be noted that NZ species are less well adapted to extremes than Australian species, so the overall effect may still result in significant impacts. Ocean acidification is perceived as the major threat to NZ waters MacDiarmid, A.; McKenzie, A.; Sturman, J.; Beaumont, J.; Mikaloff-Fletcher, S.; Dunne, J. (2012). Assessment of anthropogenic threats to New Zealand marine habitats New Zealand Aquatic Environment and Biodiversity Report No. 93.255 p (Mary Livingston, Ministry for Primary Industries)	FAQ has been deleted, comment no longer relevant.
637	38662	25	43	35	43	37	I think "collapse of coral reef systems" is not, as yet, supported by clear evidence; as noted page 4, line 19-20, "significant change in community structure" is more apprpriate. (Janice Lough, Australian Institute of Marine Science)	FAQ has been deleted, comment no longer relevant.
638	53584	25	43	35	43	38	What is the time frame for impacts? (Kristie L. Ebi, IPCC WGII TSU)	FAQ has been deleted, comment no longer relevant.
639	42557	25	43	36	43	36	"Collapse" of coral reefs is very dramatic, yet page 44 line 24 says "severe degradation". Need consistency. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	FAQ has been deleted, comment no longer relevant.
640	43119	25	43	43	43	45	Isn't it true that all impacts will be moderate or very severe depending on climate system response? I'd be interested to know of an example where this wouldn't be the case. (Jean Palutikof, Griffith University)	FAQ has been deleted, comment no longer relevant.
641	42558	25	44	1	44	1	Consider renaming as "Why are projected impacts ..." to be consistent with page 44 line 32 which refers to "projected impacts". (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	FAQ has been deleted, comment no longer relevant.
642	49411	25	44	2	0	0	Define what is meant by baseline. (Graeme Pearman, Monash University)	FAQ has been deleted, comment no longer relevant.
643	49412	25	44	4	0	0	What is the evidence for this statement? (Graeme Pearman, Monash University)	FAQ has been deleted, comment no longer relevant.
644	51532	25	44	8	44	8	"likely" -- It would be preferable to avoid casual usage of this reserved likelihood term. (Katharine Mach, IPCC WGII TSU)	FAQ has been deleted, comment no longer relevant.
645	42559	25	44	16	44	17	Replace "north-eastern and northern" with "northern". Increased wildfire risk will affect all of southern Australia, not just the south-east. (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	FAQ has been deleted, comment no longer relevant.
646	42560	25	44	21	44	28	This paragraph is mostly about adaptation, so it perhaps belongs in FAQ 25-4 (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	FAQ has been deleted, comment no longer relevant.
647	43121	25	44	30	45	3	The answer to this FAQ didn't really seem to address the question. The question is how IS Australasia adapting, at least half the answer is about capacity and needs. Lines 38 - 51 are about the how is. I'd like to see this (a) clearly divided into key points and (b) expanded by use of some examples of each key point. Otherwise, it's too dense and too dry. (Jean Palutikof, Griffith University)	FAQ has been deleted, comment no longer relevant.
648	42561	25	45	18	45	19	Give full reference so readers can find it easily (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Citation has been extended
649	49413	25	51	39	0	0	“De’Ath” or “De’ath” as in text.? (Graeme Pearman, Monash University)	"De'ath" is the correct spelling as in the draft text.
650	49414	25	54	39	0	0	Reference not found in the text? (Graeme Pearman, Monash University)	This was in fact cited in what was section 25.4 (now 25.3).
651	42711	25	58	22	58	24	The following report Hendrikx, J., and Hreinsson, E. Ö., 2010. The Potential Impact of Climate Change on Seasonal Snow Conditions in New Zealand. NIWA Client Report Prepared for the Ski Areas Association of New Zealand, CHC2010-153, 146 pp. December 2010 is listed as non peer reviewed on the Dr Hendrikx’s website. Given the scrutiny of IPCC reports and the recognized need to be robust/have confidence in is it possible to cite another reference. (Marie Keatley, University of Melbourne)	This report is no longer cited as the relevant material is now published in Hendrikx, J., Hreinsson, E. Ö, Clark, M.P., Mullan, A.B., 2012. The potential impact of climate change on seasonal snow in New Zealand: part I - An analysis using 12 GCMs. Theoretical and Applied Climatology. DOI: 10.1007/s00704-012-0711-1.
652	42712	25	58	25	0	27	If the paper Hendrikx, J., E.Ö. Hreinsson, M.P. Clark, A.B. Mullan, submitted: The potential impact of climate change on seasonal snow in New Zealand; Part I - An analysis using 12 GCMs. Submitted to. Theoretical and Applied Climatology is not accepted; then is the fall back position to cite the conference paper? (Marie Keatley, University of Melbourne)	This paper has now been published.
653	42562	25	58	35	58	35	Delete DAFF, replace Canberra with Canberra and Melbourne, and include the weblink http://www.daff.gov.au/agriculture-food/drought/national_review_of_drought_policy/climatic_assessment (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Citation updated. Weblink is not provided since the report has been issued as stand-alone pdf, not just as a web page (it is available via libraries).
654	52413	25	74	1	0	3	Reference to Reser et al., 2012, on page 74, lines 1-3 should now be: Reser, J. P., Bradley, G. L., Glendon, A. I., Ellul, M. C., & Callaghan, R. (2012b). Public risk perceptions, understandings, and responses to climate change in Australia and Great Britain. Gold Coast: Griffith University, National Climate Change Adaptation Research Facility. 298 pp (This publication and research monograph has been peer reviewed and published by the National Climate Change Adaptation Research Facility (NCCARF) [ISBN 978-1-921609-54-1.) (Joseph Reser, Griffith University)	Citation updated as requested
655	49415	25	77	4	77	6	Remove repeated text. (Graeme Pearman, Monash University)	Thank you, duplicate citation has been removed.
656	42713	25	81	45	0	0	Not all the authors of the reference (blueprint 2012) are listed (Marie Keatley, University of Melbourne)	Citation has been updated with full author list.
657	39091	25	83	0	0	0	Table 25-1. Some evidence of southward expansion of breeding populations of tropical seabirds in Western Australia (reviewed in Chambers et al. 2011, already listed p50/lines 40/41). (Eric Woehler, University of Tasmania)	There are many examples that could not be included in the table due to space restrictions.
658	39118	25	83	0	0	0	Table 25-1. Also limited evidence of of southward expansion of breeding populations of tropical seabirds in Western Australia (reviewed in Chambers et al. 2011 Emu 111:235-251; source Dunlop JN 2009. Marine Ornithology 37:99-105) (Lynda Chambers, Australian Bureau of Meteorology)	There are many examples that could not be included in the table due to space restrictions.
659	39121	25	83	0	0	0	Table 25-1 tables such as this one are very useful for scientists and others when discussing impacts of climate change and as a starting point to developing adaptation options (Lynda Chambers, Australian Bureau of Meteorology)	Noted with thanks

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
660	41519	25	83	0	0	0	Caption of Table 25-1: I suggest you insert "Australasian" before "changes" in the first line. (David Wratt, NIWA, New Zealand)	"in Australasia" inserted
661	42714	25	83	0	0	0	Table 25.1 Given that the majority of phenological changes have been documented in birds in Australia it is surprising that there are no bird examples. (Marie Keatley, University of Melbourne)	There are indeed several papers analysing correlates of bird phenology (mainly in timing of migration). However, several of these examples were cited in the AR4, and most papers published since 2006 have not found trends that were statisticaly significant for the majority of species tested. It is stated clearly in the legend to the table that the studies cited are examples, rather than being an exhaustive list.
662	46579	25	83	0	0	0	Table 25-1 Caption: The table is reinterpreting the use of the words 'confidence' from the degree of agreement and amount of evidence available to this assessment, to length of record and amount of data in a study or studies. This is dangerous. The guidelines were put in place to ensure consistent use of the term throughout AR5. (Neville Smith, Bureau of Meteorology)	We agree with the reviewer that the explanation of the confidence assessment was not completely consistent with that in the Glossary. The revised wording is in our view now fully consistent with the definition of the words in the glossary, chapter 18, and applicable guidance material.
663	46580	25	83	0	0	0	Though the LAs note that "climate change" incorporates both CC trends and CV, the reader will easily be drawn to associate the changes and trends with climate change (UNFCCC defn). In this case, the authors are really talking about identified links to the physical climate system, eg 'confidence that there is physical climate relationship (role)' in the system change. This terminology avoids unwarranted inferences of causal relationships, or of over-playing the connection to anthropogenic climate change. (Neville Smith, Bureau of Meteorology)	We feel that the explicit footnote covers the point sufficiently. We are unconvinced that the phrase proposed by the reviewer would be sufficiently understood or would avoid the potential misinterpretation.
664	46581	25	83	0	0	0	Morphology: If there is limited evidence, how can we attach medium confidence in this assessment. That study might attach that confidence because 4 out of 8 species show a trend, but it is a leap for AR5 Ch 25 to then attach the same confidence. (Neville Smith, Bureau of Meteorology)	The response was significant at $p<0.05$ for 4 of the 8 species and marginally significant for 2 others. It is clear from the table we are assessing the strength of the trend for one individual study, not assessing our overall confidence in the probability of climate change affecting species morphology.
665	49416	25	83	0	0	0	Table 25-1. Remove acronyms and spell out word in full. Note Last et al., 2001, missing punctuation. (Graeme Pearman, Monash University)	All acronyms have been spelt out when first mentioned
666	51533	25	83	0	0	0	Table 25-1. It would be preferable to italicize calibrated uncertainty language used in this table, especially in the case of the summary terms for evidence and agreement used in column 1. For the last column of the table, is confidence in the role of climate change equivalent to confidence in attribution to climate change? It could be helpful to clarify this point in the table caption. (Katharine Mach, IPCC WGII TSU)	We agree with the reviewer that the explanation of the confidence assessment was not completely consistent with that in the Glossary. The revised wording is in our view now fully consistent with the definition of the words in the glossary, chapter 18, and applicable guidance material.
667	39092	25	84	0	0	0	Table 25-1 Primary evidence of life cycle changes comes from birds and plants, would be appropiate to include more detail in the table (as has been done for butterflies, grapes and eels). Phenological changes in Australia and New Zealand have been reviewed in an upcoming book chapter by Keatley et al. 2012. (Eric Woehler, University of Tasmania)	Unfortunately space constraints precludes any further detail for most examples. The book will be cited if published by the IPCC deadline.
668	39119	25	84	0	0	0	Table 25-1 given that most evidence of life cycle changes comes from birds and plants some examples of these studies should be given in more detail in the table (as has been done for butterflies, grapes and eels). Phenological changes in Australia and New Zealand have been reviewed in an upcoming book chapter by Keatley et al. 2013 (advance copy of this chapter has been sent to the TSU as a supporting file: Keatley_etal2013_AustraliaNewZealand_Chap3_Schwatz_2ndEd.pdf). (Lynda Chambers, Australian Bureau of Meteorology)	We are aware that a review of phenological trends in relation to climate in the Southern Hemisphere has been recently submitted to a journal (Chamber et al). Providing this paper is accepted by the IPCC deadline we will consider including at least one example from it in this table.
669	49417	25	84	0	0	0	Table 25-1. Note Webb et al., 2001, missing punctuation. Need for spaces between numerals and units. (Graeme Pearman, Monash University)	Punctuation corrected
670	54001	25	84	0	85	0	Table 25-1: This is a very informative table. (Yuka Estrada, IPCC WGII TSU)	Noted with thanks
671	38663	25	85	0	85	0	Please provide reference for "nine mass bleaching events" since 1979; does this refer only to Great Barrier Reef? Would suggest that there have been 2 major (1998 and 2002) and 1 affecting southern GBR (2006). (Janice Lough, Australian Institute of Marine Science)	"Nine" has been changed to "multiple". Clearly there is disagreement among some researchers as to the definition of bleaching events.
672	38664	25	85	0	85	0	No evidence provided in these publications to support "ocean acidification" as primary drivers of calcification declines; recent study of Western Australian coral calcification trends (Cooper et al 2012) points to rates of SST change as being driver of recent rates of change in massive coral calcification. (Janice Lough, Australian Institute of Marine Science)	Wording has been corrected to identify only increasing SST as driver
673	42568	25	86	0	0	0	Table comment, you may want to consider added local policy setting to your table, as things such as local planning laws can differ greatly and have considerable impacts on the options available for farmers. This can influence their capacity to move from one local government area to another or to change enterprise types within a local government area. (Lisa Cowan, Department of Primary Industries)	Thank you for this, the Table has been removed and the key messages covered in text.
674	41673	25	87	0	0	0	Table 25-3 presents examples of observed and potential consequences of climate for invasive and pathogenic species relevant to Australia and New Zealand. Does "consequences" mean the same as "impacts" as referred to throughout the chapters? (Lourdes Tibig, The Manila Observatory)	Here consequences are used to describe how climate change alters the distribution etc of invasive species which then have impacts on ecosystems. We understand the reviewers point but feel the current description is appropriate.
675	41674	25	87	0	0	0	Is the increased incidence of Nassella neesiana between 1987 and 2005 in Marlborough, New Zealand considered an impact of climate change (Study perod is only 18 years)? (Lourdes Tibig, The Manila Observatory)	The reviewer's observation about attribution is well taken and this reference has been removed.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
676	42715	25	87	0	0	0	The increase distribution of phytophthora in Australia using the Pritchard 2011 reference is weak. This reference states Models indicate that soil warming associated with climate change is likely to increase the range of P. cinnamomi in both Europe (Bergot et al., 2004) and Australia (Podger et al., 1990). The Podger 1990 refers only to Tasmania. Podger FD,Mummery DC, Palzer CR, BrownMJ, 1990. Bioclimatic analysis of the distribution of damage to native plants in Tasmania by Phytophthora cinnamomi. Australian Journal of Ecology 15, 281–9. (Marie Keatley, University of Melbourne)	Punctuation corrected
677	49418	25	87	0	0	0	Table 25-3. Caption. Remove extra parentheses before 2008. (Graeme Pearman, Monash University)	Noted with thanks
678	49419	25	88	0	0	0	Table 25-4. Pittock et al., 2008?? (Graeme Pearman, Monash University)	Yes, this has been corrected to Pittock et al. 2008.
679	42563	25	88	1	88	1	Under "increased water security" note that desalination plants have the potential to cause conflict through increased energy demand (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Reference to conflict with demand management included.
680	49420	25	89	0	0	0	Table 25-5. Suggest alternative heading to “Primary Drivers”. Note ML is correct here and not in the text. Surely one does not need to refer to Garnaut for evidence about N2O! (Graeme Pearman, Monash University)	Heading changed to "primary goal". The row on agriculture interactions has been revised substantially based on a wider review of relevant literature.
681	45155	25	90	0	0	0	Table 25-6: this is a great effort with good intent but needs close thinking. (i) Presentation: the 2007 'rainbow' figure it replaces was iconic and widely used - I see this Figure as more complicated and not so easily put on one slide - this is worth considering as a high level summary from the chapter. Maybe it should be simplified to emphasise the benefits of adaptation over non-adaptation? or something that enables it to be compacted. (ii) The logic that leads to these particular examples is not completely clear in the associated text. For example, widespread insufficient preparedness leading to a failure of the provision of insurance in coastal communities might be another threshold economic problem; the occurrence of a catastrophic set of simultaneous (within one budget cycle) extremes (e.g. 3x the Qld floods plus other disasters last year for example) overwhelming government disaster responses funds could be another; a bit more explanation of choices is needed. (iii) I am challenged by the last row on SLR even accepting WGI's assessment that the low end scenarios might be as little as 39cm; but given this figure is about transmitting a set of key messages rather than representing everything I wonder whether this purpose would be better achieved by setting this last pair as the high end risk that cannot be ruled out, rather than covering the potential for low and high risk which then downplays the latter? The same logi may apply tot he previous case in the MDB. for discussion... (Mark Stafford-Smith, Commonwealth Scientific and Industrial Research Organisation)	Yes the new figure is somewhat more complex but the authors felt that to do justice to the additional knowledge, a greater level of specificity and detail was needed. The benefit of adaptation over non-adaptation is difficult to generalise justifiably across the different issues. The bars could be extracted for each individual risk to support communication. The logic leading to the entries in this table has been extended in the supporting text (section 25.10, synthesis, as well as the detailed sections). The issue of compound events is now flagged as an emerging risk (consistent with the definition from Chapter 19); the authors feel the literature on this is too weak and recent to justify including this as a 'key' risk. On sea level rise: the wording describing the risk has been revised, but the authors do not feel it would be a balanced presentation of the risk if the bar focused only on one end of the extreme range of scenarios. Collapsing those scenarios into a single risk would require value judgements on the side of the authors that we feel we are not in a position to make.
682	51534	25	90	0	0	0	Table 25-6. The columns and horizontal categories adopted in this table represent effective means of characterizing regional risks. The visual symbols used are intuitive and easy to understand. It would be helpful to present the legend for the table also in a visually intuitive manner, not just in footnotes. The graphics specialists in the TSU of course are available to assist with layout along these lines. (Katharine Mach, IPCC WGII TSU)	Noted, thank you, and the SOD includes a version with significant improvements thanks to the help from the TSU staff.
683	53585	25	90	0	0	0	Very interesting and informative figure. The graphs of trends under the weather factors are not easy to understand. (Kristie L. Ebi, IPCC WGII TSU)	Noted, thank you, and we hope that the improved layout and design of the table in the SOD more successfully communicates the meaning of the trends in individual climate variables.
684	38665	25	90	0	90	0	See earlier comments (page 4 and page 43) regarding use of term "Collapse of coral reef systems". (Janice Lough, Australian Institute of Marine Science)	Wording has been revised consistent with earlier comment by the same reviewer.
685	54002	25	90	0	91	0	Table 25-6: It is an interesting way to summarize information with visual elements. We can continue exploring ways to improve the presentation of this table. A few things jump out for immediate edits. Not all symbols are shown in footnotes. Since it is too small to read anyway, the y-axis title of the color bars should be removed or make them readable. It is not clear why there are four bars instead of two color bars and how they are different from each other under Potential impacts that..... It is unclear how to interpret arrows particularly indicative of magnitude and why there are multiple arrows sometimes pointing in different directions in a single row. Is each arrow associated with a climate driver illustrated just above? If so, further clarification must be provided. It may simplify the table (and gives a little more systematic looks) if different colors were used to represent different key climate drivers so that two things can be represented by a single arrow (as used in AR4). Also, different widths of arrows can be used to express indicative magnitude. (Yuka Estrada, IPCC WGII TSU)	Thank you for those detailed suggestions and the subsequent help in turning those into reality.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
686	42564	25	90	1	91	40	This table is very useful. Congratulations to the authors for a novel and clear representation of risks with and without adaptation. Some suggestions: note 0.8 C global warming from pre-industrial to present, since this affects how the reader interprets the vertical scale; increased wildfire risk is mainly in eastern NZ and southern Aus with high confidence, so this should be noted in column 1; heatwave adaptation includes transport, yet transport receives little attention in this chapter and no mention in 25.6.9.3; flood risk at present is probably in the yellow zone rather than the green zone in both countries, based on recent events, and adaptation should also consider insurance and building codes; risks for food production in the MDB presumably has greater uncertainty than water resources in southern Australia because (a) the MDB includes NE Australia where rainfall projections are very uncertain and (b) because CO2 fertilisation effects add an extra dimension of uncertainty, but this is not very obvious in the table or the supporting references; some of the symbols are missing from footnote **; why is the direction of change in damaging cyclone activity shown as increasing (presumably intensity) and decreasing (presumably frequency)? (Kevin Hennessy, Commonwealth Scientific and Industrial Research Organisation)	Thank you the for the supportive comments. The revised version indicates 2 and 4 degree warming, but we felt that a line indicating current (~2010) warming would signal an undue level of precision in this assessment. Wording has been revised to give more precision to affected regions for all risks. Re heat wave adaptation and transport: we don't feel this level of detail can be included in this table, and the literature is actually very limited on the transport-health interaction. The shading for flood risk has been revised based on this comment and recent series of flood events and adaptation options re-worded, taking into account space constraints. The risk dimension for drying in the MDB is shown as greater because of the greater range of uncertainty (compared to a narrow focus on southern Australia for water resources) and because transformational adaptation options are more limited than for water use in urban areas; text revised to help communicate this within space constraints. Missing symbols added. Changes in cyclone frequency and intensity have low confidence, hence an indication that changes could actually go in either direction appear appropriate here.
687	39120	25	91	0	0	0	Table 25-6. Symbols for figure caption missing for some variables (e.g. average temperature, sea level). Also the two sentences related to Arrows appear to be largely repeated in the figure caption. (Lynda Chambers, Australian Bureau of Meteorology)	Missing symbols have been added.
688	42716	25	91	0	0	0	P91 I am not sure that the phase “fully realized” will resonate with the general public. The use of arrows I found confusing. A couple of interpretations are 1) only two models were used or 2) more than two were used and the arrows represent their range. Symbols appear to be missing for = average temperature; = heat waves; & = CO2 concentration; and = sea level. (Marie Keatley, University of Melbourne)	Missing symbols have been added. Wording for "fully realized" has been changed to "very high".
689	49421	25	92	0	0	0	Figure 25-1. Suggest alternative wording to “external drivers”. (Graeme Pearman, Monash University)	Figure has been replaced by a standardised figure of regional climate projections and standardised caption across the regional chapters.